THE MEDICAL JOURNAL OF AUSTRALIA

VOL. II.—12TH YEAR. SYDNEY: SATURDAY, NOVEMBER 21, 1925. No. 21.

Table of Contents

[The Whole of the Literary Matter in THE MEDICAL JOURNAL OF AUSTRALIA is Copyright.]

ORIGINAL ARTICLES— PAGE.

"Infant Feeding: Its History in Relation to Present Day Methods," by HELEN M. MAYO, M.B., B.S. .. 597

"Modern Aspect of Artificial Infant Feeding," by F. N. LE MESSURIER, D.S.O., M.D., B.S. .. 603

REPORTS OF CASES—

"Torsion of an Omental Tag," by W. R. GROVES, M.D., B.S. .. 607

"Death from Anaphylactic Shock," by R. A. MONEY, M.C., M.B., Ch.M. .. 607

REVIEWS—

Bacteriology .. 608

The Mental Development of Man .. 608

Interstitial Keratitis .. 608

LEADING ARTICLES—

The Appendicitis Problem .. 609

CURRENT COMMENT— PAGE.

Infant Feeding .. 610

Measles .. 611

ABSTRACTS FROM CURRENT MEDICAL LITERATURE—

Dermatology .. 612

Radiology .. 613

BRITISH MEDICAL ASSOCIATION NEWS—

Scientific .. 614

THE HUNTER MEMORIAL FUND .. 618

MEDICAL APPOINTMENTS VACANT, ETC. .. 618

MEDICAL APPOINTMENTS: IMPORTANT NOTICE 618

DIARY FOR THE MONTH .. 618

EDITORIAL NOTICES .. 618

INFANT FEEDING: ITS HISTORY IN RELATION TO PRESENT DAY METHODS.[1]

By HELEN M. MAYO, M.B., B.S.,

Honorary Medical Officer, "Mareeba" Babies' Hospital; Honorary Physician to Out-Patients, Adelaide Children's Hospital; Chief Honorary Medical Officer, Child Welfare Centres.

WHEN I was asked to give a paper on the subject of infant feeding it seemed fitting that I should take the historical aspect as I had personally seen great changes since I began practice.

I had thought of looking back over the centuries, but a little reflection showed that I should then have no time for present day methods.

It has been recognized for thousands of years that infants fed at the breast have a far greater chance of life than those artificially fed—under some conditions their only chance. Nowadays this is still true, but our knowledge of infant management and feeding problems has developed to such an extent that the infant's chance of life after the first month, whether breast or bottle fed, is greatly enhanced.

[1] Read at a meeting of the South Australian Branch of the British Medical Association on August 27, 1925.

SIGN POSTS IN THE HISTORY OF INFANT FEEDING.

It was in the nineteenth century only that any reasonable basis for artificial feeding began to be evolved. As a result of *post mortem* examinations a classification of infant disorders was made based on their end results, so that the terms gastritis, gastroenteritis and so forth were used to describe varying conditions in which the symptoms were similar. These terms still survive as public catchwords and cover almost every conceivable crisis, metabolic or infective, causing intestinal symptoms.

It was in 1838 that Simon, of Berlin, made a chemical and physiological investigation of human milk, comparing it with cow's milk, and in 1839 to 1842 Liebig and others made a study of organic and inorganic foodstuffs and the changes that they undergo in the body. Then for thirty years no great advance was made and this work was rather forgotten. The subject did, however, receive some attention in that the relation between heat production and surface area was investigated by Bergmann in 1847; about 1860 the advantage of a properly balanced diet with regard to protein, carbohydrate and fat was recognized and the total food

requirement estimated. Nearly all the names associated with investigation of infant feeding at this time were continental; England was far behind, but in 1860 the baby's bottle was introduced there and brought with it great changes. It was by no means the first baby's bottle in the world as the Egyptians and Romans and other nations had infant bottles with nipples for sucking, but it was the first with rubber fittings. We know what a deadly instrument it was found to be, so that subsequent legislation actually declared long tube bottles illegal owing to the high mortality attending their use; but in England at any rate the invention marked an era in infant feeding, a beginning of hygiene as previous attempts had been made with cowhorns and similar devices. It was only in 1878 that Ahlfeldt, an obstetrician of Leipzig, introduced the use of the weighing machine to measure the growth and metabolism of infants; some women physicians established a standard by frequent weighing of their own babies during the period of lactation. This brought up again the question of the nutritive requirement and the work which had already been done, was brought to bear on the problem. It was seen that the small infant with its relatively large surface area has metabolism in proportion and that owing to rapid growth its requirements are relatively greater than those of the adults.

In fact the basis of present day methods was being laid down. In 1899 Rubner and Heubner published monographs on the average daily food requirements of the normal and atrophic infant which are recognized as the foundation of much of the present day practice.

In or about 1893 Soxhlet, an agricultural professor at Munich, realized that milk as usually obtained was a medium for the culture of organisms. He introduced surgical asepsis in the hygiene of cowstalls and the sterilization of milk. The former procedure owing partly to lack of knowledge among those concerned and partly to economic and technical difficulties is unfortunately still less of a fact than an ideal.

The anatomic theory of infant food disorders had so far held sway, but in 1886 Escherich brought in a new conception by investigating the bacterial flora of the intestine. For years the importance of this factor was recognized and probably over-emphasized, the expectation being that some specific organism was the cause of each disorder and that in fact infant intestinal affections were largely infections comparable to typhoid and dysentery.

An enormous amount of work has been done and has proved the reality of a few specific infections, such as dysentery and has indicated that many infant food disorders, though associated with abnormal bacterial conditions, are not specific infections.

It was in 1888, when Biedert and just before him Meigs stressed the difference between the casein of human and cow's milk, that the management of food disorders by variation in the food began. Previously the idea had been that by means of drugs these disorders could be cured, but with Biedert's attempts to adapt the food to the child a new era began. He modified milk by dilution first of whole and later of top milk, thus attempting to get a food the composition of which would approximate to that of human milk.

He considered that the casein of cow's milk is harmful to the human infant and though this has not altogether held ground, it has been retained in practice at least until the present and is even now recognized as partly true.

The work of Czerny and Keller on the nutrition of infants emphasizing the fat as a cause of infant disorders and that of Finkelstein incriminating sugar and salts were published in 1906. They were hardly in accord, but Finkelstein afterwards modified his views to some extent. His introduction of protein milk, that is milk with an increased casein and lowered carbohydrate and salts content, remains as a therapeutic measure today. Finkelstein's classification of infant disorders as (i.) nutritional disturbances, (ii.) dyspepsia, (iii.) atrophy and (iv.) intoxication has served a useful purpose in giving some clinical data both for classification and treatment.

Infant Feeding in England.

In England infant mortality was very high till the beginning of this century. Indeed at the end of the eighteenth century it might be said that only breast fed babies survived. A prejudice existed against the use of animal milk for babies lest they should develope the characteristics of the foster parents. A lurid picture is drawn by Disraeli in "Sybil" of the feeding and attention given to a foster infant in the slums.

When cow's milk began to be used with modifications and bottles came into vogue, infant mortality improved somewhat and a great impetus was given to artificial feeding.

Towards the end of the nineteenth century it was realized that nursing was going out of fashion and this led to a reaction in its favour. It was about this time that Professor Budin began his work in Paris at first providing milk for feeding infants from the maternity hospital and afterwards when this was found to lessen breast feeding instituting his *consultations des nourrissons* where the babies were brought up regularly every week for weighing and observation. He demonstrated that by such supervision many lives could be saved and much illness prevented. The work done at Huddersfield in England followed and showed that by supervision and encouragement of breast feeding many lives could be saved. The infant mortality fell from an average of one hundred and thirty per thousand for the ten years before to ninety-seven the next year (1907). From these beginnings has come the great child welfare movement which, spreading over Great Britain, the Continent, America, Australia *et cetera*, has become a great power. It aims at preserving infant and child life and lessening mortality by education of the public.

By antenatal care, by supervision of well children as well as by early recognition of disease it aims

at the prevention of illness and at promoting the fullest physical development of the individual. The infant mortality figures in England show the immense value of the work and South Australia too can bear witness that many babies have been saved.

The effect of the earlier work on the present day methods of infant feeding is plainly seen. In the last twenty years so much investigation has been done that it cannot be reviewed in detail—all the above mentioned work has been elaborated and many conclusions drawn—not all in accord. On the whole, however, an immense amount of data has been collected and from this it has been possible to evolve the more rational plan of action in infant feeding which we now employ.

Present Day Methods.

Breast Feeding.

It is generally recognized that the best food for a baby is its mother's milk. From the biological point of view, the adaptation of milk to the species of animal and the cleanliness of the procedure are all important and the experience of the ages has proved its value. This being the case, it is our duty as a profession to adopt all the means in our power to preserve this function and to develope the habit.

This is unfortunately not yet universally recognized. Too often the doctor, faced with difficulties in dealing with the breast fed infant, makes no attempt to determine the cause of the trouble, but at once weans the baby. Of course he is by no means always wrong in doing so, but the point is that he should first find out why the feeding is at fault and seek a remedy before proposing weaning. In breast feeding there are two main problems, establishment and maintenance of the supply.

The first is in the hands of the obstetric physician or nurse, the second may be in anyone's hands. With regard to the establishment of breast feeding all doctors should learn the fundamentals and all nurses should be thoroughly trained in the details of the procedure.

There is no doubt that Sir Truby King's work at Karitane has done much to establish breast feeding as an ideal for the public. It has in New Zealand been instrumental in reducing the infant mortality rate after the first month below that of any other country in the world and of demonstrating the great possibilities of the procedure.

Difficulties in Establishment of Breast Feeding.

Premature and delicate babies are unable to suck with sufficient vigour to stimulate the milk supply which may either fail to appear or after the first flush may disappear completely. Other factors may have similar effects, for example, sore or cracked nipples, hare lip and so forth. It is important to put the baby regularly to the breast soon after birth, for just a few minutes and as soon as the milk "comes in" for six to twenty minutes, not more. If more time is required, something is wrong either with the supply or with the sucking. The most important factor in establishing the supply is the sucking of the baby, as it is also the most important single factor in maintenance.

The intervals commonly recommended are three or four hourly. The times are therefore either 6 a.m., 9 a.m., 12 midday, 3 p.m., 6 p.m., 9 p.m. or 10 p.m. with no night feed or 6 a.m., 10 a.m., 2 p.m., 6 p.m., 10 p.m. with no night feed. If for some reason the child is unable to suck or sucks imperfectly, then it is advisable to empty the breast by expression after ten to twenty minutes and give the milk to the baby. This will increase the supply and in many cases the baby's power to suck improves.

It is troublesome and tedious to do this each time and it is difficult for the usually inadequate staffs of nursing homes to manage it. All too often it ends in bottles of condensed milk and weaning, the "doctor" having said that the milk was "no good."

If during this first two weeks in hospital the baby is unhappy with green stools and obvious discomfort, then something is wrong with the feeding; either there is overfeeding, underfeeding or ærophagy and it is essential to discover which is the cause of the trouble.

Weighing the baby before and after nursing for twenty-four hours gives the total intake and from this it may be decided which condition is present. Sometimes it is the time interval that is at fault and a baby uncomfortable on three hourly feedings may become happy when fed every four hours and *vice versa*. This apparently is not due to the total quantity of food taken, since it is approximately the same in each case. When overfeeding is the cause a diminution of the supply by shorter feeds may be efficacious, the supply rapidly adjusting itself to the lessened demand. If underfeeding, then expression of the breasts after each feed, massage *et cetera* to increase the supply and complementary feeding immediately after nursing should be begun. Any suitable food may be used and may be discontinued later if the supply increases.

In the charts which I show, it can be seen how this procedure may act not only at birth, but even weeks after the baby has been weaned and the extraordinary effect that can be produced by regular stimulation, regular suckling and simple rules of life, is evident. I also show the chart of a vigorous baby who was weighed before and after each feed from a few days after birth. It illustrates the initial increase in supply, the rapid intake in six to eight minutes, namely two and three-quarter to four ounces, without discomfort showing that ærophagy is produced not by rapid ingestion but by incoordinate sucking. It also illustrates that the milk supply remains the same in changing from three to four hourly feeds.

When a mother leaves hospital and returns home, even if all is well in hospital, her troubles may begin. The economic difficulties which surround a family, lead to increased activity and as a result the supply may become inadequate. The mother may not recognize this, but as the baby does not improve, she concludes that her milk is not suiting him and tries patent foods.

A mother returned from hospital with her baby and he did not grow; he was constipated, sleepy, inert and did not gain in weight; at seven weeks he developed slight diarrhœa. She thought she had plenty of milk because if expressed after nursing the milk squirted out. On a twenty-four hours test the baby was found to get three hundred cubic centimetres (ten ounces), a totally inadequate feed; with his weight, 2.9 kilograms (six and a half pounds), it was likely that he would require at least three hundred and twenty-five calories and he was getting probably only two hundred. The milk was expressed after each feed and the baby given thirty cubic centimetres (one ounce) of lactic acid milk after each feed. The next day the mother provided three hundred and ninety cubic centimetres (thirteen ounces) and the day after four hundred and sixty-five cubic centimetres, the baby increasing in weight and improving visibly.

It is not always possible to take a mother into hospital like this, but is the greatest advantage to be able to do it when required. When a baby nurses for a long time and continually goes to sleep or when it becomes angry and after a short nursing struggles against sucking, it not infrequently indicates that the supply is inadequate, though it may be due to other causes. Test feeds will show what is happening. It is quite common to find that such babies are only obtaining thirty cubic centimetres (one ounce) at a feed or even less.

Such happenings need not make one feel that weaning is necessary. It is astonishing to find what can be done both in increasing the milk supply and in bringing back the supply by adequate measures after an interval of absence.

A mother nursing her baby went into isolation here with scarlet fever, the house surgeon was interested and showed her how to express her milk, with the result that on her return home six weeks later she was able to nurse her baby again.

If the baby is being underfed then complementary feeding may be instituted, that is additional food after some or all of its nursings may be given. As a general rule a breast fed baby who is not getting quite enough, is most hungry after the twelve noon and the 6 p.m. feeds when the mother is most tired. These are then quite good times to give additional food after breast feeding. It is best given by spoon or through a slow teat in order not to make the baby lazy. It is better not to substitute a bottle for a feed until the child is getting near six months of age, when it is good practice to do so in order to facilitate weaning later. Some mothers find that the babies habitually wean themselves after a month or two and it is usual to find in such cases the breasts are not easy to suck, the child fails to strip the breast and as a result the milk dries up. If expression is regularly practised in such cases, the supply will increase and may become and remain adequate. The diet and general management of the mother are also of importance. Overfeeding is of no advantage to her and is not required; she should have an extra supply of fluid and the addition of some five hundred to eight hundred calories to her ordinary diet. More than this will be likely to upset her and do more harm than good. A good varied diet containing meat, vegetables, some fruit and so forth is the best. Exercise, rest and as far as possible freedom from worry are also important. Local stimulation, bathing and massage of the breasts are helpful, but the most important stimulus is the demand.

It is important to remember that the feeding is not the only cause of intestinal derangement.

A baby had been breast fed for four months and was doing well when it began to vomit. On being taken to a doctor it was promptly weaned. It was ultimately proved to be suffering from pyelitis and the milk supply was quite normal.

This happens with many infections and it is not generally recognized that infections of any type, even a common cold, may cause vomiting and diarrhœa in a baby and that no change in feeding is called for, simply a temporary adjustment being necessary. This is one of the most common causes of early weaning. Another is the idea that one cannot "mix milks." It is a popular belief that the profession does not seem to combat, though after all nearly every baby is fed on mixed cow's milk at some time in its life and surely there is nothing unsound in mixing human and cow's milk.

Before leaving the subject of breast feeding I would like to emphasize the facts that: (i.) Breast feeding is the most valuable means of feeding a baby at our disposal. (ii.) The milk can be increased in quantity in several ways of which the most important is emptying the breasts by expression. (iii.) If a mother thinks her baby is on the best food and likely to do well, the psychological effect is to make the milk flow more freely and in larger quantities. Probably this is the way in which "Lactogol" and stout act.

Foster Mothers.

In some infant disorders human milk is extremely desirable. In hospitals for sick babies it is of great value to have foster mothers (Wassermann tested) living on the premises. A mother may give even three hundred cubic centimetres (half a pint) of milk each time after satisfying her own baby. The variability of composition of human breast milk has been noticed in some of these foster mothers and excellent results have been recorded when the protein content of the milk is unusually high. It is probably especially good in children recovering from severe intestinal intoxication.

In the years in which I have been in practice I have been struck by the fact that infants can be reared on almost any food, if the person in charge believes in it and can make the necessary small adjustments. I have known nurses who had a profound faith in cow's milk and barley water, in Savory and Moore's and even in condensed milk who would after a struggle eventually get the baby on to the food of their choice. The reason is, of course, that in most infants the margin of adaptation is good, so that they can tolerate much and also that when one works with one food one learns how to use it.

This seems to me one of the greatest arguments for breast feeding. If only we learn enough about the necessary adaptations, surely a clean physiological food of the sort provided for the species is the best to work at and not some obviously faulty combination, such as condensed milk. Once breast feeding is well established, the next question that arises

is when should weaning take place. It is usually regarded as best to give a bottle of a milk mixture at about the sixth month with some starch to develope the digestive powers for this element of food. It is very undesirable to soften all the food, a bone with a little meat attached and a hard crust should be used for biting and these vigorous acts will serve to determine the proper development of the internal structure of the jaw and face bones. During weaning the gradual substitution of solid meals takes place and foods are added. Not more than one daily addition is made at a time and a three meal day with one or two drinks between is gradually attained, but no other food is given. Water may be given freely, especially in hot weather.

Artificial Feeding.

In the days when artificial feeding was little understood, whole milk was administered to babes with often dire results. The chemical examination of cow's milk and human gave a clue to the reason and Biedert seized upon casein as the dangerous element. The harmful nature of casein of cow's milk has been denied, but it has never quite lost hold. However much denied in theory, in practice it was found that many babies would not do well on cow's milk during the first three months and some would not do at all, so that methods for peptonizing and pancreatizing milk still continued in use, though most troubles would be referred to fats or sugars, as Czerny and Finkelstein's work suggested.

It is interesting to realize that Biedert's idea about the casein of milk has been reverted to in a modified form in the use of acidified milk. It was pointed out that the buffer value of cow's milk was very much greater than human milk and that the addition of acid to the milk made it possible for the gastric juices of a child with the acid content of cow's milk to deal with it. From this arose hydrochloric acid milk. This was used for a time, but owing to its being mineral acid which must be neutralized in the body, it was found definitely to produce acidosis in some cases and lactic acid was then used to sour milk chemically. Bacterially soured milk had been used both here and elsewhere fairly extensively, its good effects being attributed to its low sugar value and the organisms it contained. When Marriott published his paper last year on the good effects obtained by chemically soured lactic acid milk sweetened by "Karo" we began tentatively to use it and have since found it of great value. It has at Mareeba proved more useful than peptonized or pancreatized milk, that is it suits a greater proportion of babies. It has a high digestibility, a high food value and a good food balance all of which are important points in infant feeding. The method of preparation is simple.

Two hundred and forty cubic centimetres (sixteen ounces) of the milk are boiled and are allowed to get quite cold, then four cubic centimetres (one drachm) of lactic acid (British Pharmacopœia) 75% are dropped slowly in while the milk is beaten up (this takes about twenty minutes), thirty cubic centimetres (one ounce) of "Karo" syrup are added. This will keep for twenty-four hours. One of the difficulties is the "Karo" syrup which, though cheap in America, is dear here and often unobtainable. Substitutes should be obtainable with high dextrin content so as to avoid fermentation in the bowel. We have used glucose and cane and malt sugar and have had good results. The curd separates as fine powder and passes easily through the hole in the teat. Most babies like it. Its caloric value is about twenty-five calories per ounce.

It can also be made of skim milk which gives a low fat, or casein flour may be added and this gives a high protein content. Both are useful procedures when required. Eric Pritchard has laid down certain basic principles in infant feeding which are as follows: (i.) The energy value of the food consumed as measured in calories must correspond with the total energy value of the output in work, heat, growth *et cetera*. (ii.) The balance, relative proportion of the three main constituents of the diet, namely the proteins, carbohydrates and fats, must conform to the standard of breast milk. (iii.) In addition to the three main constituents there are certain essential accessory factors in a physiological diet which must not be omitted, including salts, vitamins, extractives, lecithin bodies, cholesterin *et cetera*. (iv.) The food must not only be adjusted to the existing digestive capacities, but must also be of such a nature as to promote the exfoliation of the still undeveloped digestive functions. (v.) The times and details of feeding must be made to fit in with general physiological requirements.

The excellence of these rules can be readily estimated. One is reminded of the necessity of conforming to physiological principles and of adapting them to the individual baby. It reminds one that special adaptations have to be made in the cases of babies with intolerance of various kinds and that prolonged deprivations of some food element, such as fats, may cause not perhaps xerophthalmia, but lowered defensive powers and so liability to infections. I can remember a baby years ago who had great intolerance for fats and he was kept upon low fat mixtures for a prolonged period. When he was seven or eight he was still a delicate little boy and he died from an acute infectious disease. I cannot help thinking that with some of the methods of supplying fat and vitamins now at our disposal he might have been strong enough to have overcome the infection.

This brings me to some of the ways of modifying infant food with respect to fats and carbohydrates. Fats can seldom be given up to the full human proportion in young and delicate babies on cow's milk mixtures. When the classical mixture of cow's milk ten ounces, 50% cream or emulsion six drachms, sugar one ounce, water to twenty ounces, is given, it is our experience that many infants cannot take the six drachms. Similarly with the dried milks when given in full strength there are often signs of fat intolerance. It is interesting to note that the buffer content of dried milk is

lower than that of cow's milk and this probably accounts for its greater digestibility in some cases.

One of the ways of giving high fat and carbohydrate in a concentrated food is by butter soup of Czerny-Kleinschmidt. The cooking of the butter drives off the volatile oils which act as an irritant, and it is wonderful how some children with definite fat or carbohydrate intolerance will thrive on this mixture. Carbohydrate may be given as dextrin, cane sugar, glucose and maltose or starch and starch partly converted as in some malted milk and malt soup formulæ.

It seems to be demonstrated by experience of high caloric and concentrated food methods that apparent overfeeding does not give rise to trouble, if there is a reasonable balance and also if the form in which the food is given, is not irritating either to the digestive, metabolic or eliminative organs of the body. Even slight degrees of intolerance for the form of food will cause troubles immediate or remote if the food is persistently taken. It does seem that a moderate degree of overfeeding is more desirable than the reverse, as the reserve forces are able to deal with a surplus, while a deficiency tends to lower basal metabolism and weaken the whole defence mechanism of the body.

How can we determine if a child be over or underfed? (i.) By determination of the theoretical caloric requirements and (ii.) by observation of the weight, general progress and stools.

In the caloric weight chart as shown by Pritchard the methods of estimation are clearly shown. It can be seen on this chart that the requirements per pound of body weight diminish from fifty to forty-five during the first year. This is further modified by the type of baby, climate and active crying; atrophic babies may require far more than fifty calories, whereas placid sleepy ones may need considerably less. It is however a useful standard.

As a general rule human milk can be utilized more completely than artificial foods, so that a smaller caloric value in human milk may be sufficient. This would be shown if the growth and nutrition were normal.

Professor Robertson, of the Adelaide University, prepared charts of the growth of South Australian babies and I am showing the curves which developed. Any great deviation from these curves marks a failure in metabolism due to some cause —either a faulty diet, faulty metabolism or infection.

Theories, percentages, principles have their values, but the test comes when we have to deal with the baby. Now the physician rarely deals with a perfectly healthy baby. The infant that comes to him, is usually suffering from some nutritional disturbance which may be classified as being: (i.) *ex alimentatione*, (ii.) *ex constitutione*, (iii.) *ex infectione*.

Either there has been wrong feeding in quantity, quality, balance or method or the child has a constitutional difficulty in dealing with certain elements or is a very delicate or premature baby with metabolic or congenital abnormalities or there is an infection enteral or parenteral. Any or all of these conditions may be present.

The first thing is to determine where the fault lies and for this a complete history and examination are essential. If one has time, it is a good thing to let the mother have her say. She will often give the history quite well, though not in the order in which it is recorded. A complete physical examination is desirable, including the urine and inspection of the stools. The temperature is of importance; a persistently low temperature is an indication of low basal metabolism and experience has shown that these babies improve very much on the administration of thyreoid extract in small doses. A determination of the theoretical caloric requirements is also necessary. If the fault is one of bad management and feeding, it may be advisable to remove the child to a hospital, the child and mother when the former is breast fed and the child alone otherwise.

All these things can be determined only by careful observation and attention and can by no means always be detected at the first visit. The stools for instance are often not preserved for inspection and while it is easy to dogmatize too much from the appearance of the stool, it is wise to inspect it as often as may be when dealing with infants.

The pale stool suggests fat intolerance and gives an indication for treatment, association with sore buttocks confirms this. The pale offensive alkaline stool may signify protein decomposition and suggest the addition of carbohydrate to the food. When the bowels are constipated and the stools are hard it is advisable to give carbohydrate which may be given as cane sugar, maltose *et cetera*, more being added till the stools are reasonably soft. When on the contrary there are frequent motions, acid and frothy, green, sometimes containing curds showing that the food has been passed very quickly through the intestinal tract, it is desirable to limit the amount of fermentable carbohydrate. It is often useful to give Finkelstein's protein milk with high protein and low sugar content or casein flour may be added to the food thus making the stools more alkaline. Baked flour is often a useful addition to the food instead of sugar and "Karo" syrup may also be used instead of ordinary sugar. Special foods are used for certain conditions such as vomiting or ærophagy. In these conditions feeding with very thick 10% cereal has been found of great value. When this was first suggested some years ago, rice flour was the cereal most frequently chosen, but we have found wheaten flour and baked flour equally valuable, even in very young babies suffering from pyloric stenosis. I must not discuss the question of babies that vomit, the subject requires a whole chapter to itself.

Infant feeding though full of difficulties is very different from what it was then I began practice. I can remember the feeling of bewilderment I had when confronted with a difficult feeding case, how greatly I desired principles that would lead to some plan of action. It seemed almost a blind choice. I regret to say it often was. Even now the very important choice rests too often with the mother and her friends who after they have seen one baby

do well on some particular food, feel confident all babies will do likewise. But the work of child welfare centres and the spread of knowledge generally are giving rise to a much clearer realization of the value of knowledge and experience in such work. On the whole, I think the description by Herodotus of the Babylonians who placed their sick in the market place to receive the advice of every passerby is gradually ceasing to be true of infant feeding and will be true no longer when the medical and nursing professions learn more of this interesting and complex subject.

MODERN ASPECT OF ARTIFICIAL INFANT FEEDING.[1]

By F. N. Le Messurier, D.S.O., M.D., B.S. (Adelaide),

Physician to "Mareeba" Babies' Hospital; Physician to Out-Patients, Adelaide Children's Hospital.

Recently I have had the opportunity of visiting America and while there I had the privilege of working for some months with Dr. W. McKim Marriott, of Washington University, St. Louis. His teachings and results in infant feeding impressed me and since my arrival back in South Australia I have put his methods into practice with very pleasing results.

The information given in this paper is based mainly on Dr. Marriott's teachings.

The artificial feeding of infants is difficult to practise, if one is to judge from the relatively high mortality of infants deprived of mother's milk. The blind empiricism of the past, however, is now giving way to the light of science. There are still those who have walked in darkness so long that they are dazzled by the light and prefer to close their eyes and grope on in the paths of empiricism. An empiric art cannot be taught, a science can and fortunately infant feeding is gradually becoming more of a science.

In the search for a science of infant nutrition we must not stumble into the pitfall of pseudo-science, that form of "near-science" which, being only in part true, has all of its value neutralized by the inexact portion. An excellent example of such pseudo-science is the so-called percentage method of infant feeding as often carried out in practice. This method has a considerable basis of scientific truth to commend it, but is fallacious in that it assumes that digestion is greatly influenced by small differences in the amount of water which is taken along with the fat, protein and carbohydrate.

Furthermore, the assumption is made that there is such a thing as a specific inability to digest such a substance as protein or fat or carbohydrate if it happens to be fed in a mixture in which it makes up more than, say, 3% or 4% or 7% or whatever one's fancy dictates, while at the same time digestion of other food elements where percentages of the total are less, are assumed to be well digested. It is further assumed that the examination of the stools allows one to determine what was the cause of the diarrhœa or constipation or what not. Such conclusions except in the case of such relatively rare conditions as "cœliac disease" are entirely without a clinical or experimental basis.

Let us, however, consider the few fundamental principles that furnish a basis for the practice of infant feeding. The subject is not finished. Our knowledge increases daily, but certain fundamental facts are well established. In order to gain an understanding of infant nutrition it is well to start with the normal infant as a basis and then consider such variations from the normal as may occur. By a "normal" infant we mean one weighing within 20% of the average weight for the age and with no disease or digestive disturbances. Such an infant may be successfully fed in a number of ways so long as certain fundamental conditions are fulfilled.

The food must:

(i.) Be sufficient to cover the caloric demands.
(ii.) Supply at least a certain minimal amount of protein, carbohydrate, mineral salts, water and vitamins *A, B, C, D.*
(iii.) Be capable of digestion.
(iv.) Be free from bacterial contamination.

If enough cod liver oil is supplied to cover the fat-soluble vitamin requirements and all other fats taken out of the foods, most infants will thrive for a period of several months and perhaps indefinitely. If the infant cannot live part of the day in sunlight, cod liver oil should always be added to the diet.(1) Observers in America state that 0.6 mil (ten minims) of cod liver oil daily is not sufficient to prevent rickets and recommend half a teaspoonful twice a day up to three months of age and one teaspoonful twice a day after three months of age. "Ostelin," the antirhachitic extract of cod liver oil as prepared by Glaxo House, London, can replace the crude cod liver oil. The active substance is prepared from the latter and is diluted with glycerin so that three drops of the glycerin suspension are equivalent to a teaspoonful of cod liver oil, thus giving a twenty times concentration. "Ostelin" is conveniently administered; for young children three drops may be added to one or more of the feeds per day.

Clinical observations strongly indicate an intimate relationship between fat ingestion and resistance to infection. A long continued low fat diet in infancy apparently predisposes to infection. For many years cod liver oil has been used in certain recurring or chronic infections. It is quite possible that this relationship is dependent not so much upon the fat itself as upon the accessory food factors (vitamins) carried by the fat. Continued deprivation of the factor "fat soluble *A*" vitamin definitely lowers the resistance of animals which are the subject of experiment.

To meet the caloric demands there must be fed a food with a total fuel value of 45 to 50 calories per pound of body weight per day.

On an average the number of calories required by infants has been estimated to be about 50 calories per 0.45 kilogram (one pound) of body weight

[1] Read at a meeting of the South Australian Branch of the British Medical Association on August 27, 1925.

during the first six months of life, between six months and twelve months the requirements are gradually reduced to about 45 calories per 0.45 kilogram weight. Although these figures constitute a good point of departure and a goal to aim at in regulating the dietary, they must be modified by special conditions, such as the degree of the activity and the general efficiency of the child as a working machine, the character of the clothing, the external conditions such as temperature, ventilation, movement by air and so on.[2]

Cow's milk will naturally form the basis of the diet. The milk used is ordinary mixed herd milk containing from 3.5% to 4% fat. Rich Jersey milk should not be fed to infants unless a portion of the cream is poured off. If as much as one-tenth of the body weight or one hundred grammes per kilogram or one and one-half ounces per pound of milk is given per day to an infant, the protein, mineral salts and vitamin requirement will be met, with the possible exception of the antiscorbutic vitamin which may be supplied by a very small amount of orange juice or tomato juice. This amount of cow's milk can be digested by the normal infant, except during the first two or three weeks of life. Boiling of the milk will eliminate the danger of bacterial contamination and at the same time render it more digestible.[3] For these reasons boiling of the milk for four minutes should be routine for the feeding of any infant. Constipation is hardly any more frequent in babies fed on boiled cow's milk than in those fed on raw milk, but diarrhœa is much less frequent. Dr. Alfred F. Hess[4] states: "Contrary to what is commonly believed, boiling milk for a few minutes does not produce a food which must be considered as scorbutic."

It is, however, advisable to supply the antiscorbutic vitamin *C* to all infants artificially fed. A satisfactory method is to give orange juice or canned tomato juice daily after the first two or three months of life. This is given from a bottle half way between two of the morning feedings. One-half ounce of either orange juice or tomato juice a day are sufficient. The average infant needs about two and one-half ounces of fluid per pound of body weight per day.[1]

If boiled undiluted cow's milk were fed to infants in sufficient amount to cover the caloric and water requirement, as much as two and one-half ounces per pound would be necessary and even then the sugar would be somewhat below the optimum requirement at least for younger children. Some infants can take this amount of milk per day, but the majority cannot. This is largely due to the fact that cow's milk contains a considerable amount of "buffer substance," at least three times as much as breast milk. This substance neutralizes the gastric juice so that the stomach contents do not become so acid as when breast milk is taken. Hence the stomach empties more slowly, the bactericidal action of the juices is lost and there is lacking the stimulus to bile and pancreatic secretion.

Older children can better care for cow's milk as the gastric secretion improves. We must then usually content ourselves with feeding about one and one-half ounces to the pound of body weight and make up the calories in some other way. This may be done by adding either fat or sugar. Practical experience has shown that the addition of fat in the form of cream or top milk is a somewhat dangerous experience. A safer method of adding fat is perhaps as "butter flour" mixture of Czerny-Kleinschmidt. The addition of carbohydrate is for practical purposes the more desirable method of adding additional food to the diet. Sugar or starch or both may be added. It is desirable to adjust the relationship between carbohydrate and protein in the diet so that there is neither a strongly alkaline intestinal content resulting in the loss of fat in insoluble soaps, nor a strongly acid intestinal content resulting in diarrhœa and a loss not only of fat, but of all food constituents. There is a theoretical reason for selecting milk sugar, as it is the natural sugar of the milk and a commercial reason for the use of such sugars as the dextrin and maltose preparations on the market, such as "Karo" Corn Syrup, Mellin's Food, "Maltogen," Mead's "Dextri-Maltose." I know of no good reasons so far as the baby is concerned. Cane sugar can replace lactose and "Karo" Corn Syrup is the sugar which I would select from among the malt preparations. The average composition of "Karo" Corn Syrup (blue label) is: Moisture 23.50%, dextrose and maltose 30.26%, dextrin 42.12%.[5]

An infant may often take larger amounts of sugar when a mixture of sugars is fed than when a single sugar is given. The explanation is that intestinal bacteria capable of fermenting one form of sugar may not ferment others as well. The malt sugar preparations contain varying amounts of maltose and of dextrin and in general those with much maltose and little dextrin (Mellin's Food and "Maltogen") are laxative, while those which contain much dextrin and relatively little maltose are somewhat constipating ("Karo" Corn Syrup). For most purposes cane sugar is all sufficient. The amount of sugar added to bring up the caloric requirement will be a half ounce during the first few weeks, after that about an ounce until at four months one and one-half ounces are added.

Starch in the form of a gruel is a valuable food and may be begun at the second or third month. Much of it passes through undigested at the start, but makes no trouble unless the doctor examines the stool microscopically.

In the new born infants the amylolytic ferments of both salivary and pancreatic glands are present in sufficient amount to digest as much starch as is represented in the cereal waters that are commonly the only form of starch given at this age.[6] The fact that Sauer and Helmholz have been able to feed successfully very young infants as high as 10% of farina in cases of pyloric stenosis without evidence of starch indigestion would confirm the idea that even the youngest infant can digest as much starch as may seem indicated for one reason or another.

The starch has in addition to its simple food value

a clinically well known action that is not shared by the sugars. An infant that will no longer gain in weight on a simple milk, water and sugar mixture, will commonly gain as soon as starch is added to the food, even though only in so small an amount as would be represented in a cereal water. This action seems not wholly due to the added food, but to some peculiar property inherent in the starch that causes a stimulation of the metabolism of the sugars, fats and salts. This probably explains the uniform improvement and rapid gain in weight at about the fifth month of the baby that has not done well on a simple milk, water and sugar mixture, if cereals are added to the diet.

The weights of the various starches and sugars and their caloric value per ounce are as shown in the accompanying table.

TABLE SHOWING CALORIC VALUE OF VARIOUS STARCHES AND SUGARS.

Variety of Starch or Sugar.	Quantity.	Caloric Value per Ounce.
Cane Sugar	2½ level tablespoons ("Glaxo" measure)	120
"Karo" Corn Syrup	2 " "	120
Lactose	4 " "	120
"Maltogen"	5 " "	111
Mellin's Food ..	5 " "	105
Glucose	1½ " "	120
Flour Ball	4½ " "	100
Wheat Flour ..	4½ " "	100
Barley Flour ..	4 " "	100

We then take some boiled milk and sugar or cereal and mix them together and are ready to feed the baby. The mixture may be a rather concentrated one so that when we have divided it into five or six feedings, the volume of each feeding will be smaller than the infant is accustomed to take. There will be some danger of overfeeding if the infant is given as much of such a mixture as he wants to fill his stomach and a danger that he will cry if his stomach is not filled. Furthermore, more water is needed, so that the mixture is diluted at first with about an equal volume of gruel, at five months with about one-third volume of gruel and at nine months dilution is unnecessary. Some cereal from a spoon and meat broths and vegetable *purée* may be begun at six months.

It is not necessary to feed a normal bottle fed baby more often than every four hours. Such a method of feeding a normal baby as has been outlined is only one of the many ways of fulfilling the infant's nutritional requirements.

The sick or abnormal baby is treated by certain simple modifications of the above scheme. The infant that is malnourished, requires almost as much food per day as the normal infant of the same age. A fair estimate of his food requirements may be made by calculating what his weight should be if he had developed normally from birth. He should then be fed according to this weight, rather than his actual weight (see accompaning chart) .

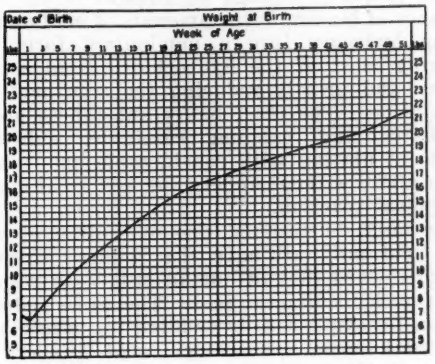

Chart Showing Infant Weight Record.

If breast milk is unobtainable and cow's milk must be used, it is usually possible to give a considerably larger amount, provided the buffer substance is removed or neutralized. This may be accomplished: (i.) By the addition of lactic acid produced by the growth of such organisms as the *Bacillus bulgaricus* or *Bacillus acidophilus*; (ii.) by the addition of hydrochloric acid as described by Faber;[7] (iii.) by the addition of lactic acid as described by Marriott;[8] (iv.) by the addition of citric acid (lemon juice) as described by A. F. Hess;[9] (v.) by the addition of acetic acid (vinegar) as described by B. S. Dunham.[10]

As mentioned before cow's milk neutralizes a large amount of the hydrochloric acid of the stomach and the resultant effect is an interference with the activity of the gastric enzymes through a reduction of the gastric acidity below the optimal hydrogen-ion concentration zone of P_H 3.5 to 5.0.

The effective "strength" of any acid solution may be expressed in terms of the number of grammes of ionized hydrogen present in solution. A normal solution of hydrochloric acid contains approximately one gramme of ionized hydrogen per litre; a tenth normal solution 0.1 gramme of ionized hydrogen and a millionth normal solution 0.000001 gramme. In order to simplify the expressions and to avoid the use of ciphers, it is customary to use logarithmic terms with negative exponents and indicate a tenth normal solution of acid as having a hydrogen-ion concentration of 10^{-1}, a millionth normal solution as 10^{-6}, or more simply as P_H1, P_H6 *et cetera*.

The different enzymes of the stomach appear to require that the gastric acidity shall reach a threshold of about P_H5-0, before any of them except rennet become usefully active. Therefore it is assumed that the infant's stomach cannot perform its task in the digestive process unless it is able to produce enough hydrochloric acid to raise the level of acidity to this point.

The prime essential of cow's milk modification for infant feeding thus becomes according to Faber and Marriott the reduction of buffers. The action of hydrochloric acid in the process of digestion is largely, if not entirely, due to the number of free hydrogen-ions present. Milk, especially cow's milk,

has the property through its content of the buffer substance of binding large amounts of acid and converting hydrogen into a non-ionized form, thus rendering most of the hydrochloric acid secreted inactive and greatly reducing the true acidity of the solution. The chief buffer substances are the phosphates and calcium caseinate, substances capable of uniting with considerable quantities of acid or alkali without undergoing any great changes in chemical reaction.

Sour milk, buttermilk, protein milk and whole lactic acid milk all have the "buffer" substance reduced toward that of human milk as a result of the formation of lactic acid. The same reduction may be accomplished by adding to whole cow's sweet milk some hydrochloric acid (Faber) and citric acid (Hess) and acetic acid (Dunham).

Marriott has emphasized the desirability of using lactic acid, an organic acid that may be completely burned in the body rather than the inorganic hydrochloric acid. Hydrochloric acid is not burned in the body, it must be neutralized and excreted. The addition of sixty cubic centimetres of tenth normal hydrochloric acid per one hundred cubic centimetres of milk in the day's feeding would just about double the total acid content of the body, which must be cared for by the acid-base regulating mechanism. Hydrochloric acid milk was not considered suitable for infants under six weeks of age, while lactic acid milk was recommended for all ages. Citric acid milk was not thought to be advisable for infants aged less than two months; while vinegar milk was given undiluted except to infants younger than two months who received four ounces of water or gruel in the total daily feedings. Lactic acid milk may be given undiluted to and is apparently well digested by the premature infant, the vigorous well baby, the puny athreptic, the infant ill with diarrhœa or an acute infectious disease.

At "Mareeba" Babies' Hospital the results of feeding with lactic acid milk have been very encouraging. Recently owing to a shortage of lactic acid, vinegar milk has been used, but the results have not been as satisfactory and there is a decided tendency to frequency of stools and intertrigo of the buttocks. To prepare acid milk a good grade of cow's milk is first sterilized by boiling for four to five minutes. The milk is then cooled and the scum removed. When the milk is thoroughly cool, lactic acid is dropped in slowly, while the milk is gently stirred. Lactic acid 75% is used and the amount required is one drachm (four cubic centimetres) to sixteen ounces (five hundred cubic centimetres) of milk. This is added a drop at a time from a medicine dropper. If the milk is warm when the acid is added or if the acid is run in too rapidly, large clumps of curds will separate.

Lactic acid milk is practically sterile even under the most adverse conditions. Pure cultures of colon and dysentery bacilli have been introduced into lactic acid milk and there has been no growth at the end of twenty-four hours.[11]

The babies are fed at four hourly intervals with the exception of premature and very small babies. One must see that the fundamental conditions of vitamins *et cetera* are fulfilled as mentioned in the case of the normal infant.

A food that has proved to be of the greatest assistance in the artificial feeding of premature, small and undernourished infants not suffering from any acute digestive disturbance has been Czerny-Kleinschmidt's "butter-flour" mixture. The original mixture calls for the following ingredients: Butter, seven grammes; flour, seven grammes; sugar, five grammes; water, one hundred cubic centimetres. Flour and butter are always in equal amounts. The mixture is diluted with milk in the proportion of two-thirds butter flour to one-third whole milk for children weighing less than 2.9 kilograms (six and a half pounds) and three-fifths butter flour to two-fifths milk for children in a better state of nutrition. The amount of milk given must always be less than one-tenth the body weight in ounces.

The ingredients for making butter flour mixture as used at "Mareeba" Babies' Hospital are as follows: two level tablespoonfuls of butter, four and a half level tablespoonfuls of baked flour, two level tablespoonfuls of cane sugar, fourteen ounces of water ("Glaxo" measure of tablespoonful is used).

In the preparation of the mixture the butter is taken and placed in a pan and is heated gently until foaming takes place; it is kept at this temperature for five to eight minutes or until all odour disappears and volatile acids are driven off. The flour and sugar are taken and mixed in smoothly to a paste and allowed to boil for five minutes, then water is added and it is boiled again for ten minutes. It is then rubbed through a sieve.

Diarrhœa occurring in an infant is a danger signal and usually requires some modification of the diet. Infantile diarrhœa may be divided into two main groups, those of known ætiology and those of unknown ætiology. The first group contains only bacillary and amœbic dysentery: the second is made up of all other varieties of diarrhœa.

Infantile diarrhœa, except bacillary and amœbic, is not a primary bacterial infection, but is the result of changes produced by causes such as external heat, too much clothing, by infections outside the gastrointestinal tract (parenteral infection), fever and overfeeding with an improper diet which cause a reduction in the activity of the duodenal enzymes and secretions as a result of the primary insult.[12]

As a result undigested and unabsorbed food products in the duodenum are then fermented by organisms of the colon group from the caecum and large intestine. This fermentation yields irritating end products which accelerate peristalsis and produce diarrhœa. This irritation is a chemical rather than a bacterial inflammation. This explains why pathological lesions may be absent from the intestinal tract at necropsy.[13]

Starvation or underfeeding by lowering the functional capacity of the gastrointestinal tract also often leads to diarrhœa. Failure to recognize this fact has led to many serious errors in feeding.

The indications for treatment of the diarrhœa are to give a food which is a poor culture medium and one which is completely absorbed.

At the same time a sufficient number of calories must be supplied to maintain the nutrition and enough water introduced to prevent desiccation of the tissues. Treatment must also be directed towards any infections present which may be the underlying cause of the diarrhœa. In the case of severe diarrhœa it is often advisable to institute a short period of starvation in order to allow the intestinal tract to empty itself of such food remains as may be serving as a culture medium for bacteria. Cathartics are unnecessary and generally do more harm than good. Decreasing the amount of sugar makes the food a poorer culture medium. Sugars that are fermented with difficulty such as dextrin and "Karo" are then indicated. Removing the fat renders the food less irritating and more quickly absorbed. The addition of protein in the form of casein curds or dried casein flour helps to keep up the caloric value. Artificial souring of the milk produces a poor culture medium and also makes the milk more readily digestible by decreasing the "buffer" substance.

These are some of the ways the food may be changed to meet the requirements of the baby with diarrhœa. Above all we must treat the baby and not the stools.

In conclusion I want to point out the fact that there is a science of infant nutrition and that a few simple foods such as sweet and sour milk, milk curds and sugar comprise a useful armamentarium. The indications for the use of these are simple and readily understood by anyone.

References.

(1) Edward A. Park: "Newer Viewpoints in Infant Feeding," *New York State Journal of Medicine*, November, 1924, page 921.

(2) Eric Pritchard: "Physiological Feeding of Infants and Children," page 10.

(3) Joseph Brennemann Abt: "Pediatrics," Volume II., page 653.

(4) Alfred F. Hess: Quoted in Abt's "Pediatrics," Volume II., page 861.

(5) Corn Products Refining Company, New York: "The Ultimate Carbohydrate," page 12.

(6) Joseph Brennemann Abt: "Pediatrics," Volume II., page 645.

(7) H. K. Faber: "Hydrochloric Acid Milk in Infant Feeding," *American Journal of Diseases of Children*, November, 1923, page 401.

(8) W. M. Marriott and L. T. Davidson: "Acidified Whole Milk as a Routine Infant Food," *The Journal of the American Medical Association*, December 15, 1923, page 2007.

(9) A. F. Hess and M. J. Matzner: "The Value of Milk Acidified with Lemon Juice," *The Journal of the American Medical Association*, May 17, 1924, page 1604.

(10) B. S. Dunham: "Acidification of Milk with Vinegar (Acetic Acid) in Infant Feeding," *American Journal of Diseases of Children*, February, 1925, page 200.

(11) M. C. Field: "A Clinical Study of Lactic Acid Milk as a Routine Feeding for Sick and Healthy Infants," *Archives of Pediatrics*, August, 1924.

(12) Wilburt C. Davison: "The Bacteriology of Diarrhœa in Infants," *South Medical Journal*, Volume XVII., 1924, page 552.

(13) Wilburt C. Davison: "The Duodenal Contents of Infants in Health and During and Following Diarrhœa," *American Journal of Diseases of Children*, June, 1925, page 743.

Reports of Cases.

TORSION OF AN OMENTAL TAG.

By W. R. Groves, M.D., B.S.,
Honorary Surgeon, Kyneton District Hospital, Victoria.

Dr. Allan's report in The Medical Journal of Australia of August 22 1925 of a case of torsion of a normal fallopian tube reminds me of a condition which I encountered some months ago.

A woman, aged fifty-five years, experienced abdominal pain of a mild spasmodic type one afternoon. She kept about and was able to sleep fairly well that night. The following day the pain was more severe, but she did not stay in bed. She had a very bad night and the next day could not get up. The pain continuing to be severe, she sent for me in the afternoon. She located the pain to the right of the umbilicus where there was a fairly localized area of acute tenderness with little or no rigidity. The pulse rate was 86 in the minute and the temperature normal. There had been no vomiting and the bowels had acted. No history of previous attacks was elicited. The patient was removed to the hospital and operated upon.

The appendix and structures nearby were normal and the hand passed up to the gall bladder detected no cause for the attack. On bringing the hand down from this region I happened to feel a small hard lump the size of a passion fruit. On delivery this proved to be a piece of the omentum, plum coloured and almost detached, connected to the free edge of the omentum by a slender stalk which was merely twisted blood vessels.

Complete relief followed its removal.

DEATH FROM ANAPHYLACTIC SHOCK.

By R. A. Money, M.C., M.B., Ch.M.,
Medical Superintendent, Royal Prince Alfred Hospital, Camperdown, Sydney.

A male patient, *ætatis* forty-nine years, was admitted to the Royal Prince Alfred Hospital under Dr. S. A. Smith on June 27, 1924.

Twenty years previously he had suffered from asthma from which he had been free until he contracted "bronchitis" six years ago. Since then the attacks occurred about once a month, more frequently in damp and cold weather. He also complained of a chronic cough with sputum and pain in the left side of the chest.

Physical examination revealed signs of chronic bronchitis and emphysema. No tubercle bacilli were found on examination of the sputum. The X ray report was to the effect that tuberculosis of both lungs was present. The Ear, Nose and Throat Surgeon reported the presence of nasal polypi and recommended ethmoidal curettage. These polypi were considered to be a possible source for the initiation of his asthmatical attacks and the operation was performed on July 13, 1924. On July 15, 1924 the patient developed an erysipelas of his face which began over his nose and spread rapidly in a butterfly fashion despite local treatment. Next day the condition was more extensive, the patient's temperature had risen to 40° C. and it was decided to administer antistreptococcal serum, twenty cubic centimetres being given intramuscularly in the gluteal region. About one minute later the patient's respiration became embarrassed as in a typical attack of asthma, the chief difficulty being with expiration. The embarrassment progressed rapidly, the patient became cyanosed, lost consciousness and respiration finally ceased with the thoracic wall in a position of full inspiration. Then followed an epileptiform attack, when all the voluntary musculature contracted tonically, the jaw was clenched, the patient frothed at the mouth and the pulse was full, slow and bounding. The jaw was

gagged open, adrenalin administered in large doses, but without avail. The heart gradually ceased to beat and after a few ineffectual gasps for air the patient died.

A *post mortem* examination was made by Dr. Mona Ross. Both lungs contained an overgrowth of fibrous tissue and were the seat of an acute purulent bronchitis. No signs of old or recent tuberculosis were found. There was no thymus gland visible macroscopically. The lymph glands at the root of the lungs were enlarged. The left ventricle was dilated and the heart was healthy. The spleen was slightly enlarged and pulpy. The kidneys were acutely congested. Cultures made from the blood, brain and spleen were sterile.

The sudden march of events leading up to this patient's death was most dramatic, occupying about three minutes. No history of any previous inoculations with horse serum was obtainable, nor were tests made to determine whether the patient's asthma was due to a sensitiveness to horse protein, as the nose was regarded as a probable focus.

On the evidence death was considered to be due to an anaphylactic shock produced by the injection of anti-streptococcal serum.

Acknowledgements are due to Dr. S. A. Smith for his kind permission to publish these notes.

Reviews.

BACTERIOLOGY.

THE continuous advances of recent years in bacteriology and its kindred sciences necessitate the appearance at comparatively short intervals of new editions of the well known textbooks on the subject. The eighth edition of Park and Williams's "Pathogenic Microorganisms" will be welcomed therefore by the laboratory workers as well as by the student.[1]

It would appear almost superfluous to review a work so universally and favourably known as the present, but some note might be made of the changes in the new edition. As in the fifth and subsequent editions, the text is divided into three parts. Part I. deals with the general characteristics and methods of study; Part II. with the individual pathogenic microorganisms and Part III. with applied microbiology.

The chapters on immunity and serology in Part I. have been largely rewritten and amplified. The authors' experience with active immunization against diphtheria have enabled them to utilize observations that bear on the general problems of immunity. The principles underlying the complement deviation reaction are discussed, one method of the reaction as applied to the diagnosis of syphilis is given in full, namely that employed at the Serologic Laboratory, New York. Among the precipitin tests for syphilis the Kahn test is described in full.

In Part II., dealing with the individual microorganisms, the authors have adopted in addition to the common names the new terminology proposed by the Society of American Bacteriologists and have rearranged the grouping to some extent to conform more closely to the new classification. Much of this part has been rewritten to include the newer knowledge of such bacteria as the pathogenic anaerobes or the additions to knowledge of such diseases as scarlet fever, typhus fever, tularæmia *et cetera*. Naturally diphtheria is dealt with at some considerable length, but this is especially valuable in view of the amount of original work carried out in connexion with the Schick test and toxin-antitoxin immunization. A useful chart is provided for the identification of pathogenic bacteria, including some of the commoner non-pathogenic types of importance in diagnosis. The microorganisms as described in Part II. include not only bacteria, but the higher bacteria, moulds and yeasts, filtrable viruses and pathogenic protozoa.

Part III. on applied microbiology includes such subjects as vaccine therapy; serum therapy; bacteriology of air and water, of milk, of shell fish, of the soil and of sewage; disinfectants and so forth.

The book is illustrated with nine full page plates and two hundred and eleven engravings and several new comprehensive tabulations are given. The references are given at the foot of the pages, a convenient method in a book of this type, and cover the essential advances made during the last few years.

THE MENTAL DEVELOPMENT OF MAN.

DR. HARRY CAMPBELL has written an interesting little book entitled "Man's Mental Evolution, Past and Future," which will provide sufficient easy reading for one evening and food for thought for many evenings.[1] This book is an expansion of a paper contributed by Dr. Campbell to the Ethological Society in 1923 and in it the author describes how man has outstripped all other animals in evolution through superior development in intelligence and how he has arrived at a state where supernormal intelligence has no survival value, but where moral development will carry with it the advantage that primarily pertained to superintelligence. According to the author's figures the aristocracy, upper middle class and lower middle class represent only 20% of the whole population, the remaining 80% being comprised of skilled artisans, unskilled workers and unemployables. "It is mainly by a chosen section of the upper middle class that the difficult work of the world is done and were it not for the gifted few we might still be living in caves and clad in skins. The evolution of the mind with the evolution of the nervous system gives a greater advantage over all those not so well equipped." There are several references to the mentality of the Australian aborigines which are not as clean cut as they might be, for example: "The brain of the Australian aborigine is the most primitive both as regards size and structure." "The Australian aborigine whose mental level is but little lower than that of the white man." "Apparently the intelligence of the American red skin and the African negro is above that of the Australian. How far it is below that of the modern European I do not know." In other respects the book is clearly expressed.

INTERSTITIAL KERATITIS.

DR. R. LINDSAY REA, the author of a brochure of thirty-two pages which is an analysis of ninety-one cases of interstitial keratitis treated by him, sketches the course, behaviour and treatment of the condition.[2] The book is very well printed and produced, but the contents, though true, are trite and hardly seem to warrant so dignified a presentment. It comes as rather an anticlimax after Holmes Spicer's exhaustive work on the same disease, recently noticed in these columns. The latter seems to have said all that there is to say on the subject. Dr. Lindsay Rea, however, almost justifies his effort by labouring the opinion that antisyphilitic treatment is a clamant need and this, strange though it may sound, needs saying again. We have always held the view, based on experience, that when such treatment seems futile in the way of shortening the attack, it must be for the patient's benefit to treat the constitutional taint and this is syphilis in 93% of cases. The reason of failure is too often insufficient dosage. For emphasizing this point the author deserves praise.

---

[1] "Pathogenic Micro-Organisms: A Practical Manual for Students, Physicians and Health Officers," by William Hallock Park, M.D., Anna Wessels Williams, M.D., and Charles Krumwiede, M.D.; Eighth Edition, Enlarged and Thoroughly Revised; 1924. Philadelphia and New York: Lea and Febiger. Royal 8vo., pp. 811, with 211 engravings and 9 full-page plates. Price: $6.50.

[1] "Man's Mental Evolution, Past and Future," by Harry Campbell, M.D.; 1923. London: Baillière, Tindall & Cox; Crown 8vo., pp. 79. Price: 3s. 6d. net.

[2] "A Preliminary Report on the Treatment of Interstitial Keratitis," by R. Lindsay Rea, M.D., F.R.C.S.; 1925. London: H. K. Lewis & Company, Limited. Demy 8vo., pp. 32, with four coloured plates. Price: 2s. 6d. net.

The Medical Journal of Australia

SATURDAY, NOVEMBER 21, 1925.

The Appendicitis Problem.

It is only about twenty-five years since appendicitis was officially recognized in the United Kingdom as a notifiable cause of death. Since that time the incidence of this condition has undoubtedly increased and in spite of the growth of knowledge and the advance of surgical methods the mortality has not become less. If anything, it is becoming somewhat larger as the years pass. In England and Wales during 1913, 2,528 persons or 69 per million died from appendicitis; in 1923 the figures were 2,826 or 74 per million. The total number of deaths in Australia during the year 1924 was 54,980 and 408 of these were due to "appendicitis and typhlitis." Males accounted for 254 of the deaths and females for 154. In the four years 1920 to 1923 inclusive the deaths from appendicitis and typhlitis numbered respectively 382, 351, 402 and 436. An approximate idea of the case mortality from appendicitis as far as hospital practice is concerned may be gathered from the report of the Royal Prince Alfred Hospital for 1924. The number of patients admitted with acute and chronic appendicitis was 537 and one died. Thirty-four were admitted with appendiceal abscess and four died. Seven were admitted with a ruptured appendix and general peritonitis and five died. Percentages cannot be computed from these figures, unless consideration is given to the number of patients remaining in hospital at the end of the year. In any case the numbers are too small to justify this. In 1921 the number of patients with acute and chronic appendicitis admitted to the same hospital was 426 and three died. Fifty-six were admitted with appendiceal abscess and eight died and of six with a ruptured appendix and general peritonitis two died. Figures for hospital practice in the country would be hard to obtain. It is probably correct to conclude that in the country the recovery rate would not be as high as in city hospital practice. The distances over which acutely ill patients have to travel, and delay in seeking medical advice on account of distance would be partly responsible for this. It is the common experience of country practitioners to have patients brought to them from great distances or to be summoned from outlying places only to find that as a result of delay the appendiceal lesion has made such headway that the patient is either beyond surgical aid or at any rate in very grave danger. It will be seen, however, that the number of deaths from appendicitis *per annum* in Australia (approximately 74 per million) is about the same as that of England and Wales.

In view of the menace of appendicitis and of the heavy toll which it exacts every year from the community, it may be well to consider whether sufficient is being done to reduce its morbidity and mortality. Appendicitis is always the result of an infective process. An appendix which is the seat of chronic inflammatory changes, certainly owes its condition to an acute inflammation in the first instance. The treatment of persons suffering from appendicitis lies almost solely in the hands of the surgeons and with them rests the task of grappling with the preventive as well as the curative aspect of the whole question. Have surgeons taken a proper interest in the discovery of the conditions which initiate the infective process in the appendix? Have they regarded appendicitis as a pathological problem awaiting solution? Or have they been content with their human carpentry, their cure by mutilation? It must be confessed that the last named is the attitude adopted by very many surgeons. This was well evidenced at a recent discussion by the Section of Surgery of the Royal Society of Medicine on "The Mortality of Appendicitis." Statistics were quoted by some speakers and the discussion developed into one on the question of whether operations should be undertaken immediately in all cases or whether expectant treatment should be adopted and, if so, when this method should obtain. Not one speaker attacked the subject from the preventive aspect. It must not be thought that we do not regard an exact diagnosis and early operation as important. On the contrary in the present state of knowledge they must be considered as essential. The fact which should be recognized, is that little or nothing is known of the

conditions which predispose to appendicitis or of the factors which actually determine the onset of an attack. Is some preexisting state of susceptibility of the appendiceal mucous membrane occasioned by influences which may be modified or controlled? Why are men attacked more frequently than women? Why is appendicitis most usually found in persons between the ages of ten and thirty and comparatively seldom after the age of forty? Is any importance to be attached to the curious family incidence which is occasionally manifested? Is appendicitis one of the penalties which humanity must pay for modern civilization? These are a few of the questions which require an answer. Pathologists are not idle on the side of the problem as they see it. What is necessary is an entirely new outlook on the part of surgeons. The collaboration of surgeon, pathologist and physician is indispensable. Good surgery implies something more than dexterity in operating, even when combined with sound judgement.

Current Comment.

INFANT FEEDING.

In all discussions on infant feeding too much stress cannot be laid on the necessity for the use of breast milk where it is possible and on the advantages reaped by the infant when this course is adopted. As a rule so much attention is given to the relative value of different forms of food and the methods of its preparation and to the means adopted to bring the food up to a standard which is supposed to represent that of human milk, that Nature's method is pushed into the background. Adequate emphasis was laid on this aspect in the pages of this journal in 1922 by Dr. Margaret Harper and again in this issue Dr. Helen Mayo has pointed the finger in the right direction. It is probably correct to say that behind the neglect of breast feeding lies in large measure the apathy of medical practitioners, their non-insistence and their spineless yielding to the importunities of mother and nurse when either one or the other is too lazy to carry out her duty. At the same time it must be recognized that breast feeding cannot always be adopted. Complementary feeding may be required, the child may be ill or other circumstances may combine in so unfortunate a manner that, even given the desire to cooperate on the part of every one concerned, artificial feeding alone is possible.

Dr. Le Messurier's article on artificial feeding represents the latest teaching on the subject and will be read with great interest. He does well to draw attention to the necessity for the use of scales in the management of artificial feeding and to measuring the infant's needs in terms of calories. Empiricism is gradually becoming and should become a thing of the past in this regard. The papers of both Dr. Mayo and Dr. Le Messurier are based on work being done at the "Mareeba" Babies' Hospital, Adelaide, and it may be mentioned in passing that medical practitioners visiting Adelaide will derive both interest and benefit from a visit to this institution and an investigation into the methods of working. The last word has not been written about this complex subject and many divergent views are held. This was well exemplified in a recent discussion held by the Section of the Royal Society of Medicine devoted to the study of disease in children.[1] The question of the day was whether any modification of cow's milk is necessary in infant feeding. Dr. Leonard Findlay said that undiluted cow's milk was the best substitute for human milk. The only modification which he considers necessary, is sterilization by pasteurization. In his opinion any rational modification of cow's milk is impossible. The greater amount of protein in cow's milk and the fact that this protein is chiefly in the form of caseinogen suggest that some dilution is necessary. The difference, however, is more subtle than one of mere quantity. Protein is really effective as such by virtue of the amino acids of which it is composed. Some of these, especially tryptophane and lysin, are absolutely essential. The lactalbumin in one hundred cubic centimetres of cow's milk amounts to only 0.5 gramme compared with one gramme in an equal quantity of human milk. Since of the two human lactalbumin is much richer in leucin, lysin and tryptophane, any modification of cow's milk by dilution is a serious matter. After summarizing Ludwig Meyer's whey exchange experiments and showing that an artificial whey is unsatisfactory, Dr. Findlay pointed out that although the real cause of the difference between cow's milk and human milk is not known, enough is known of the chemical composition of both for it to be realized that humanization of cow's milk is a mere "figment of the imagination." The protein itself defies transformation. Dr. Findlay holds that there is no evidence that the poorly nourished child in the absence of enteritis is marantic because he is not able to deal efficiently with the various proximate principles as presented in cow's milk.

Dr. Eric Pritchard was opposed to accepting the delusion that one of the "most complicated and kaleidoscopic" problems in the whole realm of medicine can be solved by the simple formula of cow's milk undiluted and unmodified. In nearly all ailing infants intolerance for some element or other is present and the intolerance has generally been caused by an excess of the element in question. If a medical practitioner is constantly practising scientific modification of cow's milk, he will be more resourceful in dealing with sick children than will the man who confines himself to the flat method of treating all such children with whole milk. In

[1] *Proceedings of the Royal Society of Medicine*, September 1925.

cow's milk there is an excess of caseinogen. If the stomach is able to deal with the excess, its capacity to provide hydrochloric acid is overdeveloped. Harris has estimated that five times as much of this acid must be secreted to digest the caseinogen in whole milk as is required for the digestion of an equal quantity of breast milk. The resulting hyperchlorhydria brings in its train many troubles which are easy to recognize after the cow's milk diet has been relinquished.

Dr. Leonard Parsons asked for evidence that protein is indigestible. In his opinion it is necessary to give an excess of protein because lactalbumin is the most efficient growth protein known, but the amount of it in cow's milk is so small and caseinogen is such a poor substitute that it is essential to give an amount of protein that is excessive when compared with the amount of protein in breast milk. Dr. Pritchard in reply to Dr. Parsons said that in infants the clinical picture of protein decomposition was very clear and could be recognized by alkaline and offensive stools and muddy complexion as well as by the stupor and other evidence of poisoning by the toxins produced by the bowel.

It is seen from all this that the subject is still "complicated and kaleidoscopic." Two points emerge from its consideration. One is that breast feeding must be sought with all the determination and diligence that the medical practitioner can command. The second is that, if artificial feeding has to be undertaken, empiricism must be cast aside and scientific endeavour and control take its place.

MEASLES.

In our issue of June 6, 1925, we referred to work done by Denton in regard to a Gram-negative bacillus found by him at *post mortem* examination of the bodies of three persons dead of uncomplicated measles. While he did not claim that this bacillus was the causative organism of measles, he expressed the opinion that further investigation should be undertaken in regard to the ætiological relationship which it might bear to the disease. It was also pointed out that Caronia claimed to have isolated a diplococcus from the blood, bone marrow, nasopharyngeal secretion and cerebro-spinal fluid of children suffering from measles. He regarded this organism as specific. No finality has been reached in regard to the causative organism of measles. Among those who have investigated the problem is Dr. Ruth Tunnicliff. She has published several communications on the subject and has described a small Gram-positive diplococcus which she isolated from the blood, eyes, nose, throat and sputum of patients suffering from measles during the pre-eruptive stage and soon after the appearance of the rash. Dr. Tunnicliff grew the organism in anaerobic cultures from the blood. In the second generation it grew under aerobic conditions. It grows readily when cultured from the respiratory tract and produces small colonies, green in colour, on aerobic blood agar plates. It is to be noted that the organism described by Caronia is anaerobic.

Dr. Tunnicliff has published a further study on this diplococcus.[1] She points out that when first isolated and small, the cocci generally pass through a tested Berkefeld N filter. The blood of patients with measles manifests a distinct increase in specific agglutinins and opsonins for this diplococcus from the third to the eighth day following the appearance of the eruption. The possibility of a selective transfer of an unknown virus by only the green-producing diplococcus appears small because diplococcus cultures, originally isolated from single colonies, have produced a reaction in rabbits of the seventh generation, while rabbits similarly inoculated with the second generation of cultures of staphylococci, green and hæmolyptic streptococci from the same plates developed no symptoms of measles.

Dr. Tunnicliff found that the diplococcus produced a skin reaction in rabbits and in certain individuals and investigated this reaction with a view to throwing light on the relationship of the diplococcus to measles. Two different strains were used, but most of the experiments were made with a culture, isolated two years previously, with which Koplik spots, eruptions and fever had been produced in rabbits. A few drops of ascitic fluid were added to each five cubic centimetres of 1% dextrose broth and cultures were grown anaerobically under oil. The cocci in the broth were then killed by the addition of 0.5% phenol at room temperature. This antigen was then diluted with salt solution to a point that gave no reaction in persons who had previously had measles; generally a dilution of one in forty was suitable. The control solution used was anaerobic ascites broth culture medium to which had been added phenol and salt solution. No reaction occurred with this solution. When twenty-eight persons who gave a history of measles or were convalescing from measles, were injected intradermally no reaction occurred other than redness such as was produced by the control injection. One person with a history of measles manifested a reaction. Twenty-six persons who had not had measles, gave a definite reaction in from four to forty-eight hours in the form of a circumscribed area of erythema of varying intensity. The area measured from one to two centimetres in diameter and as a rule was accompanied by slight infiltration. Dr. Tunnicliff does not state whether any persons who had not had measles, failed to give a reaction. Some interesting neutralization experiments were carried out on persons who had not had measles. Serum from a person who had not had measles, was used as a control serum. The measles antigen was mixed with equal parts of salt solution, control serum and serum from convalescent patients. These several mixtures were incubated and injected. In twenty hours the mixtures with salt solution and control serum produced a circumscribed area of erythema 1.5 centimetres in diameter. The mixture with convalescent serum produced no reaction. Dr. Tunnicliff concludes from these observations that the Gram-positive, green-producing diplococcus found in measles has an ætiological significance.

[1] *The Journal of Infectious Diseases*, September, 1925.

Abstracts from Current Medical Literature.

DERMATOLOGY.

Anthrax.

HUGH MACKAY (*Canadian Medical Association Journal*, June, 1925) reports an instance of an unusual case of anthrax in man. Left sided pneumonia was diagnosed and was followed in three days by pseudocrisis and involvement of the right side. Five days after admission the skin of the face, neck and dorsum of the hand were affected. The involved area was thickly studded with papules, vesico-pustules and occasional bullæ. Laboratory experiments definitely established the disease as anthrax. The administration of fifty cubic centimetres of anti-anthrax serum was followed by improvement in the patient's physical condition. A fatal termination ensued four months after the patient's admission. At the pathological examination of specimens removed at *post mortem* examination *Staphylococcus aureus* alone was found. The author holds that this indicates that the serum sterilized the tissues as far as anthrax was concerned.

Actinomycosis.

A. H. WATERMAN AND GILBERT FITZPATRICK (*Annals of Clinical Medicine*, May, 1925) report an instance of cutaneous actinomycosis recurring after pregnancy. The authors claim several points of interest in the report. The absence of any ætiological factors that might account for the actinomycotic infection is noticeable, the patient having lived in the city all her life. There were no carious teeth or abrasions of the mucous membranes, a history of having chewed grass in her childhood being the only incriminating thing. Each time the patient became pregnant actinomycotic symptoms reappeared. The recurrence after apparent cure lasted sixteen months. X ray treatment when applied over long periods controlled the condition, but was not successful in eradicating it. Intravenous massive doses of sodium iodide were effective in controlling the symptoms and were tolerated, while smaller doses were not. No idiosyncrasy to iodides was evident when sodium iodide was injected into the blood stream.

Nodosités Juxta-Articulaires.

PERPETUO D. GUTIERREZ (*Archives of Dermatology and Syphilology*, August, 1925) writes that Lutz first described *nodosités juxta-articulaires*. The tumours are always situated about the joints and are especially common about the external malleolus, the olecranon and head of the femur. They are hard, lobulated and adherent to neither skin nor periosteum. The tumours do not disappear spontaneously, although Gauseline observed a nodule soften and discharge a citron coloured fluid not unlike the caseous material of a tuberculous abscess Search for microorganisms was fruitless. Authors differ with regard to ætiology. The French mostly believe that the tumours are of syphilitic origin, although there is a good deal of evidence pointing to yaws. The only disease which simulates these tumours closely and for which they can be mistaken, is the "subcutaneous fibroid syphiloma" of Weber. These can be differentiated by histological examination and also by the history of the patient. Yaws is not transmitted from the mother to the offspring and pregnancies are not influenced by the virus of the disease. In all cases improvement results from the use of "Neoarsphenamin."

Parasitic Eczema.

R. BOENKE (*Medical Journal and Record*, July, 1925) writes that clinically several types of parasitic eczema are reported. *Tinea cruris* or *eczema marginatum* involves the perineum and the adjacent parts of the thighs, being bilaterally symmetrical owing to apposition of the opposing surfaces. In long standing cases the lesion may extend upward on to the pubic region, outwards on the groin and downwards along the inner aspect of the thigh towards the knees. The lesions have a sharply demarcated border. The inflammation does not gradually shade off into the surrounding skin. The condition is increased by heat and moisture which are commonly present in those parts of the body affected. In a series of two hundred and thirty-eight cases 50% occurred in persons compelled to use water extensively in their occupations. This is due to the organism thriving in the presence of heat and moisture.

Dermatitis.

S. WILLIAM BECKER (*Archives of Dermatology and Syphilology*, August, 1925) reports an instance of dermatitis in association with disease or injury of the peripheral nerves. The condition appeared three weeks after section of the posterior root of the Gasserian ganglion. Herpes at no time was suggested. Pyorrhœa and dental caries were present in the affected side. The condition was little influenced by treatment and had been present for about four years. Experimental and clinical observations would seem to indicate that a toxic, infectious or mechanical irritation of the sensory nerves can be instrumental in producing this type of lesion. Various hypotheses are put forward to account for the condition. Hypothetical causes not related to the nervous system comprise the influence of external agents, compressions *et cetera*, the influence of internal agents, functional inactivity and the propagation of inflammation along the nerves to the tissues supplied by them. Hypothetical causes related to the nervous system comprise vasomotor, direct trophic and reflex action. Samuel sought by a series of physiological experiments and clinical observations to establish the fact that there are nerve fibres with definite paths—the function of which is to regulate the nourishment of the normal tissues. The scope of the term trophic formerly including all disturbances of nutrition, has been narrowed to embrace only disturbances to which a direct nerve influence is applicable.

Ichthyosiform Erythroderma.

RICHARD WEISS AND NORMAN TOBIAS (*Archives of Dermatology and Syphilology*, August, 1925) write that ichthyosiform erythroderma may be present at birth, but is usually noticed a few days to a few months later. Occasionally it appears about puberty. Heredity does not appear to play an important rôle, but there is a distinct familial tendency. It occurs equally in both sexes. Erythroderma usually precedes ichthyosis, but fades as the patient gets older, while the scaly, thickened skin becomes more prominent. The erythroderma may be mild or pronounced, may be more severe at times or may even disappear after a few years. The hyperkeratosis may vary from a mild xerosis to a hystrix type. The disease may be universal, generalized or localized. Other congenital defects may be present. There is usually a predeliction for the flexor surfaces. The scalp and face are usually scaly. In some cases *keratosis filaris* and palmar and plantar keratoderma are also present. An interesting feature is the tendency to overdevelopment or underdevelopment of the hair and nails. Exacerbations and reversions are common, the patient usually improving during the summer months. The exact cause of the disorder is unknown. It may be classified among the ectodermal defects, most of which are congenital and hereditary. From the standpoint of heredity the condition is interesting. Apparently a determiner is present in the chromosomes which stops or impedes the development of the upper layers of the skin. The pathological changes are similar to those of *ichthyosis vulgaris*.

Nitritoid Crises Following Bismuth Injections.

C. SIMON (*Medical Journal and Record*, July, 1925) calls attention to the fact that even intramuscular injections of an insoluble bismuth salt may give rise to nitritoid crises similar to those following intravenous injections of "Arsphenamin." The crises are characterized by sudden flushing of the face, conjunctival congestion, general discomfort and a bounding pulse. None of six patients however vomited subsequently or manifested syncopal pallor. The crises occurred immediately after properly performed intramuscular injections with all customary precautions taken to obviate entrance of drug into a vein. In no case did the crises follow the initial injection of bismuth.

RADIOLOGY.

Fractures of the Os Calcis.

A. C. HALL (*American Journal of Roentgenology*, July, 1925) contributes a paper on fractures of the *os calcis*. Such fractures are much more common than is usually thought and they are often overlooked. Treatment is difficult even when the fracture is early recognized, but when the fracture is old, the resulting disability is very great. The usual cause is a fall on the feet from a height. The fracture is usually comminuted and the bone is forced upwards and bulges outwards and the arch of the foot is flattened. After diagnosis in recent cases, the patient is put to bed for a week until the active reaction has subsided and in the meantime the foot and leg are prepared for operation. The *tendo achillis* is then lengthened to release the tension of the calf muscles. With the foot on a sandbag, a roller bandage is placed beneath the lateral malleolus and over the *os calcis* and the bone is moulded into position by hammering with a mallet. An incision is next made over the posterior part of the *os calcis*, anterior to the insertion of the *tendo achillis* and the *os calcis* pulled down and the arch of the foot pressed upward. A plaster cast is then applied and the foot held on the corrected position and the cast should extend from the toes to the kneejoint. At the end of the month the cast is discarded and massage and physiotherapy employed. At the end of seven weeks the patient may walk. The treatment described has led to better functional results than any previously reported forms of treatment.

Treatment of X Ray Burns.

F. VEIEL (*Klinische Wochenschrift*, July 9, 1925) gives details of the histories of three patients suffering from severe X ray burns which had resisted various methods of treatment. He finally got good results within two to three months from the frequent application of warm linseed meal poultices. The linseed was mixed with milk and cooked until the mixture was thick enough for a spoon to stand upright in it.

Ulcer of Greater Curvature.

EDWARD S. BLAINE (*American Journal of Roentgenology*, July, 1925) writes of penetrating ulcer of the greater curvature of the stomach. He refers to the fact that most ulcers occur on the lesser curvature and so are easily recognized in the ordinary position of examination. The author reports in this paper three cases of penetrating ulcer of the greater curvature in the upper portion of the stomach. He also points out the difficulty in demonstrating such ulcers, if they are of small size. Food entering the stomach usually follows the lesser curvature line and this area is more subject to irritation than the other parts of the stomach and so most ulcers occur along the lesser curvature. Owing to the rugosity of the greater curvature shadow it is easy to overlook ulcer in this region.

Intracranial Calcifications.

J. O'SULLIVAN (*British Journal of Radiology* [B.I.R. Section], August, 1925) contributes a paper on some rarer intracranial ossifications and calcifications. Such calcifications are common in the chorioid plexus, Pacchionian bodies, the pineal gland and the pituitary gland. Psammomata, old tuberculous and syphilitic lesions, aneurysms, old hæmorrhagic areas and cysts often manifest calcification. The *dura mater* is more frequently affected than other tissues. When areas in the *falx cerebri* become ossified, they are frequently referred to as osteomata of the *falx*. Osseous deposits also occur in the *tentorium cerebelli* near the *dorsum sellæ* and near the *clivus*. An irregular ossification in the *dura mater* bordering the longitudinal sinus is rather an uncommon lesion. The paper contains notes on several cases of intracranial calcification and ossification.

Gall Bladder Visualization.

G. SABATIM AND E. MALINI describe an original method of demonstrating the gall bladder after the administration of the bromine salts of sodium and strontium (*La Presse Médicale*, August, 29, 1925). Great care is necessary in preparing the patient. On the morning before examination, some broth and an egg are taken and at 2 p.m. a good dose of castor oil and at 5 p.m. a glass of milk are given. No other nourishment (either solid or liquid) is allowed before the drug is taken. At 9 p.m. a saline enema is employed to clear the colon. About 3 a.m. on the morning of examination twenty grammes of the mixed bromides of sodium and strontium dissolved in water are taken by mouth. Skiagrams are taken at five, eight and twelve hours. Plates are exposed in the postero-anterior direction with a gas tube carrying fifty milliampéres of current for half a second. Usually the gall bladder is outlined at the fifth hour examination. Failure to outline the bladder points to the presence of cystic duct blockage and gall stones cast "negative" shadows. The authors consider that the density of the shadow in the usual sodium tetrabromphenolphthalein test is due to the bromine content rather than to the phthalein content.

Gastric Diverticulum.

IRVING GRAY (*American Journal of Roentgenology*, August, 1925) refers to the rarity of gastric diverticulum and reports a case. The diverticulum caused no symptoms. When the opaque medium entered the stomach a large finger-like projection was seen jutting out from the gastric shadow, just below the cardiac orifice. At the end of four hours the stomach was empty, but the diverticulum still held barium sulphate and some of the meal was still present after seven days. Sir Arthur Keith points out that the wall of the stomach is weak around the cardiac orifice and under certain conditions a pouch may form in this situation as a result of increased intragastric pressure. The author holds that these diverticula may be congenital in origin. A review of the literature on this subject accompanies the article.

Cholecystography.

C. S. OAKMAN reports his work on examination of the gall bladder by the oral administration of radiopaque salts (*American Journal of Roentgenology*, August, 1925). The author prefers the oral method to the intravenous method of administration on account of its simplicity. Sodium tetraiodo-phenolphthalein is preferred to the bromide salt on account of its greater density, a smaller amount is thus required for a dose; the salt is given in salol coated capsules. The author takes skiagrams before administration and examinations are made at fourteen, sixteen and eighteen hours. Later in the series of one hundred cases only the fourteen hour plates were taken. The patient must be carefully prepared and must follow the directions. Compound liquorice powder is given on the day preceding examination and the evening meal should be moderate and excessive fats should be avoided. Capsules containing one gramme each are given one before the evening meal, one during the evening meal and one after it and the remainder at half hour intervals. The patient drinks water freely and takes a couple of 1.3 gramme (twenty grain) doses of sodium bicarbonate during the evening. This prevents decomposition of the salts. An opaque meal is given after the gall bladder examination. When the gall bladder fills it is possible to state that it is not the seat of a pathological lesion. Contraindications to the use of the method are pyloric stenosis, hyperemesis and cirrhosis of the liver.

Radiation Sickness.

E. H. ZWEIFEL (*British Journal of Radiology*, July, 1925) refers to the sickness sometimes associated with deep radiation over the abdomen. He considers that this sickness and also the burning of the skin can be avoided. The sickness has been attributed to ozone and to nitrous acid fumes and certainly efficient ventilation and large rooms are helpful in the prevention of this hyperemesis. The author uses two hundred cubic centimetres of salt solution given as an enema or subcutaneously. The author also has his tubes completely enclosed in lead and no rays are allowed to escape except through the aperture directed to the patient. Such protection also prevents any possibility of damage to the operators. Previous to its installation one of the hospital sisters developed pernicious anæmia, while no changes have been noted in operators since.

British Medical Association News.

SCIENTIFIC.

A MEETING OF THE PREVENTIVE MEDICINE SECTION OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the B.M.A. Building, East Melbourne, on July 2, 1925.

Election of President.

DR. T. W. SINCLAIR was elected President of the Section in succession to DR. R. H. FETHERSTON who retired after holding the office since the inauguration of the Section in June, 1921.

Poliomyelitis.

A discussion on the subject of poliomyelitis was opened by DR. REGINALD WEBSTER. Dr. Webster illustrated his remarks by lantern slides which he had prepared during the epidemic in 1918 as a result of his experimental work on monkeys. These slides had previously been shown at a meeting of the Melbourne Pædiatric Society (see THE MEDICAL JOURNAL OF AUSTRALIA May 3, 1924).

DR. T. W. SINCLAIR discussed the disease from the public health point of view. He quoted figures of 1925. Ninety-one cases of poliomyelitis had been reported in the State in 1925 and of these seventy-two cases had occurred in the metropolis. These were the highest figures since 1916 except during the epidemic in 1918 when there were three hundred and three cases in the State. It was a usual feature for the figures of reported cases to be less in the second half of the year, but in view of experience in New Zealand interest in diagnosis, treatment and general management of the disease had been stimulated. Prevention was intimately concerned with diagnosis.

There were four types of the disease. The nonparalytic or abortive type represented 50% or even 70% to 80% of total incidence. In these cases human carriers were a handicap as regards control. The second type was the ataxic, the third was the cortical and the fourth was the ordinary or spinal or subcortical type. There were two phases of the disease, a general systemic attack and a specialized expression in the central nervous system together with the possibility of healthy carriers.

In New York City in the 1910 epidemic a meningitis division had been formed. There was a City Diagnostic Laboratory and in the *Bulletin* of February 7, 1925, Dr. Josephine Neale had described the division which dealt with cerebrospinal meningitis, poliomyelitis and encephalitis. At the laboratory there was a staff ready to consult with any practitioner. The necessary instruments for lumbar puncture and microscopical examination were provided. These were taken to where the patient was located. Any practitioner could ring up the laboratory at any time for assistance of diagnosticians. From the point of view of isolation cerebrospinal meningitis, poliomyelitis and encephalitis were very much the same. Swabbing had been given up in the case of cerebrospinal meningitis. Cerebrospinal meningitis and poliomyelitis patients were isolated for three weeks. Encephalitis patients were not isolated. Contacts or "carriers" were not isolated, but were advised in regard to personal hygiene and care of secretions. Many young children who were affected did not need hospital treatment and did better in their own homes.

DR. ROBERT SOUTHBY said that he had been asked to direct his remarks chiefly towards the symptomatology and early diagnosis of poliomyelitis. In the first place it must be remembered that it was a specific infectious disease occurring sporadically and in epidemics in a manner very similar to cerebrospinal meningitis. Another point which should always be borne in mind, was that only a small proportion of individuals affected by the specific virus ultimately developed a definite paralysis. The symptomatology of the disease could be divided into three phases, a general systemic infection, an invasion of the nervous system and the onset of paralysis.

The phases of general systemic infection might present all degrees of severity from a mild coryza which attracted no undue attention, to a more definite feeling of malaise perhaps with a nasopharyngitis and slight rise of temperature or to a severe general infection accompanied by fever, headache, vomiting and constipation. Up to this stage there was really nothing to suggest the possibility of poliomyelitis and in children especially such a train of symptoms could easily be the precursor of any one of a dozen or more infections. During an epidemic, however, a patient presenting the symptoms previously mentioned should always be regarded as possibly suffering from poliomyelitis until this condition could be disproved. There were other symptoms, however, even at this early stage which might suggest or even definitely indicate that the condition was one of poliomyelitis. For example, at the onset the child might be drowsy and irritable or peevish or he might be restless and resent any interference or attempt to amuse him. The mother would often state that the child had apparently changed completely in character and from being normally good tempered and of bright disposition would become cross and bad tempered and even object to being humoured by his own parents.

Retention of urine was another symptom which often occurred at the onset and profuse sweating was another feature frequently encountered. A gradual onset with ill defined symptoms and slight fever followed by a period of remission and then a recurrence of similar symptoms was also said to be very characteristic. It constituted the "dromedary" type described by Draper, but this had not been common in the recent cases in Melbourne.

Involvement of the central nervous system was indicated at first by an exaggeration of the tendon reflexes, hyperæsthesia which might be localized or generalized, and pain at the back of the neck especially if the head was lifted forward. Pain was also caused by flexing the lower part of the spine. Definite head retraction and neck stiffness and Kernig's sign were not the rule, but might be present in severe cases. With definite indications of nervous system involvement examination of the cerebrospinal fluid might greatly assist in the diagnosis by providing definite evidence of an inflammatory process in the meninges—a response on the part of the so-called meningo-chorioid defensive mechanism. The fluid would be under increased pressure, usually clear, but possibly opalescent and would show a definite increase in the globulin content and in the cell count. A count of more than ten cells per cubic millimetre indicated some degree of meningeal inflammation. The lymphocytes usually predominated. Apart from an epidemic such findings would be quite compatible with tuberculous meningitis and other forms of encephalitis, but during the course of an epidemic they would strongly indicate the possibility of poliomyelitis and in association with the previously mentioned general symptoms would justify the therapeutic use of serum from convalescent patients.

With the onset of the stage of paralysis there was a diminution of the tendon reflexes associated with a paresis of the affected muscles, followed later by absence of the reflexes and a complete flaccid paralysis of the part involved. With these signs, of course there was no question as to the diagnosis, but by this time most of the damage had been done and serum treatment would be of no avail except for the prevention of extending paralysis in the very severe cases. This emphasized the absolute importance of early diagnosis.

The greatest difficulty lay in the variability of the initial symptoms and while one child might pass through all three of the phases just described, another might go to bed one night apparently quite well and wake up the next morning paralysed. However, with the facilities made available for lumbar puncture and examination of the cerebrospinal fluid it should be possible to detect most if not all cases in the early stages and at that time alone was the serum of value.

In examining the case histories of twenty of the patients who had been admitted to the Children's Hospital recently Dr. Southby had found that in thirteen instances the mode of onset had been more or less typical and in accordance with the train of symptoms just described. These patients had all arrived at hospital with a flaccid paralysis and the diagnosis had been obvious.

The ages had varied from sixteen months to twelve and a half years, but the affected children had mostly been under five years.

Dr. Southby quoted the clinical notes of one of these typical cases. A female, aged three years and three months, had become ill with malaise, headache, fever, vomiting and constipation. These symptoms had persisted for three days. On the fourth day of the illness the child had become drowsy and looked sick and definite head retraction had been present. On the fifth day she had been irritable and hyperæsthetic especially in the left leg which was then noticed to be weak. At this stage she had been brought to hospital and on examination the knee and ankle jerks were found to be less active on the left side. On the sixth day she had had a flaccid paralysis of the left leg with absent knee and ankle jerks.

The other patients however, had all presented some unusual features which he thought might be of sufficient interest to warrant quotation of their clinical histories in detail. With three of these children the onset had been very acute and meningeal symptoms had overshadowed all others.

Their notes were as follows:

A male patient, aged eleven years, had been quite well until two weeks before admission when he had suddenly complained of severe and persistent headache. At that time the condition had been regarded as acute *otitis media* with possibly a secondary meningitis. On admission he had had retention of urine for twenty-four hours and when examined had been found to be afebrile and drowsy. Double Kernig's sign had been present, but there had been no neck stiffness. The knee jerks had not been elicited on either side. Four days later he had complained of pain on sitting up and had still been troubled with retention of urine. On the following day he had a flaccid paralysis of both legs.

The illness of another patient, aged nine years, had been characterized by a sudden onset with fever, headache and severe pain in the lumbar region for thirty hours prior to admission. On examination he had been febrile and had had pronounced neck stiffness and a decided double Kernig's sign. The left knee jerk had been sluggish. Lumbar puncture had revealed a clear fluid under increased pressure and with a slight increase in globulin and mononuclear cell content. Two days later he had cried with the pain in his back. The left knee jerk had then been found to be absent and the boy had a flaccid paralysis of the left leg.

A female patient, aged twelve years and six months, had suddenly screamed twelve hours before admission with "pain in the back" and shortly afterwards had lost the power in her arms. Five hours later she had been unable to use her legs. She had vomited after the onset and had been febrile and constipated. Later she had suffered from incontinence of urine and fæces and had developed a paralysis of both arms and both legs.

Dr. Southby said that it was worthy of note that these three children, all of whom suffered an acute and sudden onset with severe meningeal signs, were the oldest children in this group.

Two other patients also had an acute onset to their illness.

A male patient, aged four years and four months, five days before admission had suddenly complained of headache and had "fallen in a heap." He had been helped up and had been able to walk but was limping with the right leg. The next day he had been unable to walk on account of the pain in the leg. Three days after the onset he had suffered from retention of urine for thirty hours. On arrival at hospital the child had a flaccid paralysis of the right leg.

The illness of a female patient, aged three years and three months, had been characterized by sudden onset with drowsiness, fever, sore throat and irritability. It was noticed that she was not moving the left leg. She had then become flushed, had sweated profusely, had become convulsed and the respiration had become very distressed. On examination the child had been found to be in great respiratory distress, she had been very irritable and had appeared to be hyperæsthetic and the left leg was flaccid. No knee jerk had been obtainable on this side. This child had died from respiratory failure two hours after admission.

Dr. Southby explained that he had mentioned the last case particularly because a sudden onset with convulsions was exceptional and during an epidemic would be against rather than in favour of the possibility of poliomyelitis. It might be mentioned that three of these children had complained of twitching sensations in the arms and legs during the onset.

The condition of the next child had at first simulated that of a tuberculous arthritis of the hip joint.

Five weeks before admission a male child, aged six years and eleven months, had complained of pain in the right knee and had begun to limp when walking. He had also been awakened at night with pain in the leg although there had apparently been no pain in the hip joint itself. On examination he had walked with the right leg slightly abducted and externally rotated, but there had been no limitation of movement at the hip joint. Definite wasting of the thigh and calf muscles had been observed. The knee jerks and ankle jerks had not been elicited.

The last patient was the most interesting of the series.

A male patient, aged one year and four months, had become feverish and irritable nine hours before admission and had had a generalized convulsion. His temperature had been 40.3° C. (104.5° F.) his pulse rate had been 140 and his respirations had numbered 56 in the minute. On examination the only physical signs had been a definite diminution of breath sounds with some rise in pitch at the base of the right lung.

Two days later he had again had convulsions; lumbar puncture had yielded clear fluid under increased pressure, but there was no increase in cells or globulin.

For seven days after admission he had remained febrile, the temperature varying from 40° C. to 38° C. (104°F. to 101° F.) the pulse rate from 168 to 116 and the respirations from 56 to 36. The patient looked as though he was suffering from pneumonia but the physical signs in the chest had not progressed.

His temperature had then fallen by crisis and he had seemed very much better, but on the following day it had been noticed that he was not moving the right arm or leg. The following day (the ninth day from admission) he had had a complete flaccid paralysis of the arm and leg.

Dr. Southby said that in conclusion he would like to mention the other point of interest in connexion with these cases, namely that quite a number of these children had reacted to the Schick test. Whether this was of any significance or merely a coincidence was a matter for conjecture and he would like to ask if any members had had a similar experience in this respect.

Dr. Jean Macnamara said that the announcement by Dr. Southby in April, 1925, of the increased demands for admission to the Children's Hospital of children suffering from poliomyelitis had directed attention to the possibility of a large epidemic in a city such as Melbourne. The question had naturally arisen as to what measures could be taken to avert an epidemic or to cope satisfactorily with an epidemic, should the incidence of cases continue through the winter or diminish with the onset of cold weather to assume epidemic proportions next summer or autumn.

Unfortunately no specific means of conferring immunity were available. Some of the general measures previously adopted deserved reconsideration. In a review of the New York epidemic of 1916, published by the Board of Health at the close, there was a statement of measures recommended for adoption in the event of a reappearance of the disease. Points stressed were early diagnosis, prompt notification, effective isolation, a well informed public and a forewarned medical profession.

During the same period a campaign of cleanliness had been undertaken, everyone had cooperated in keeping houses, streets and particularly children clean and despite six thousand deaths from poliomyelitis which occurred in the registration area from June to November, the infantile and general death rate had been lower than in the preceding summer when no epidemic had been present.

In the absence of any specific means for preventing infection the main consideration must be treatment of those patients in whom the generalized infection was complicated by the invasion of the spinal cord, in other

words patients whose condition was recognized as infantile paralysis. Unfortunately she could not yet speak from personal experience of treatment of poliomyelitis by immune serum. This work had been suggested to Netter by experimental work of Landsteiner and Levaditi, of Flexner and Lewis. These observers had detected neutralizing substances in the serum of monkeys and men who had recovered from attacks. In 1910 Flexner and Lewis had shown that immune human serum had the power of preventing the development of the disease when administered intrathecally twenty-four hours after the intracerebral inoculation of a fatal dose of virus. During the 1916 epidemic human serum had been used. Any conclusion as to results from any form of treatment in a disease which was so varied both in its symptoms and its prognosis as to life and as to function, must be given with reserve, but the conclusions reached then were these.

When serum was given in the preparalytic stage results were favourable. In most cases paralysis did not ensue; when paralysis did occur, the tendency was for speedy recovery. In later and more severe forms treated after paralysis had already made a distinct headway and the muscles of respiration were becoming involved, an inhibitory effect upon further progress had been noted and lives had been saved. Serum treatment had been carried out in hospitals and in homes. At first it had been given only intrathecally, after the clinical diagnosis had been confirmed by a microscopical examination of the cerebrospinal fluid. Later, a series of patients treated by Amoss and Chesney had served to demonstrate that much better results were obtained when the amount of serum administered was increased beyond that which could be given intrathecally. The dosage varied with the age of the child, usually five to fifteen cubic centimetres were given intrathecally and up to one hundred cubic centimetres intravenously. The conclusions reached by Amoss and Chesney were six in number. In the first place the serum taken from recently recovered patients yielded the best results. Immune principles had been demonstrated in the blood as early as the sixth day after the onset of paralysis. Secondly administration was free from danger when the serum used was sterile, free from corpuscles and hæmoglobin and injected slowly. Thirdly serum should be administered both intravenously and intrathecally. Fourthly the decision to employ serum should rest upon a clinical examination supported by the result of microscopical and chemical examination of the cerebrospinal fluid. In the fifth place repeated doses might be needed and lastly the earlier the administration, the better the result.

From New Zealand no detailed information had been obtained, but in a pamphlet issued to medical practitioners by the President of the New Zealand Branch of the British Medical Association, Dr. J. S. Elliott, and the Director-General of Health, Dr. T. H. Valintine, it was stated that convalescent serum given intrathecally and intravenously at an early stage had proved of undoubted curative value. Because of the results obtained by the Rockefeller workers it had been decided that some provision should be made for obtaining serum locally, as a cable to New Zealand had brought the reply that none was available there.

By various means seventy old patients willing to act as donors had been traced. Of these there were several recently affected adults who were willing to give small donations at regular intervals. With the valuable cooperation of the Walter and Eliza Hall Institute and the Commonwealth Serum Laboratory workers blood had been obtained and one thousand three hundred and fifty cubic centimetres of serum were ready. It was proposed to continue the search for donors in order that large supplies of serum could be quickly obtained if need arose. In each case the diagnosis was verified and an absence of reaction of the blood serum to the Wassermann test was demonstrated before the preparation of the serum was begun. These tests were being carried out at the Walter and Eliza Hall Institute. The details of the technique followed in obtaining and preparing the serum would be submitted for approval to a Medical Advisory Committee consisting of Dr. F. G. Morgan, representing the Commonwealth Serum Laboratories, Dr. Scholes, Dr. R. Webster and Dr. C. H. Kellaway. Serum had been put up in ampoules of ten cubic centimetres and fifteen cubic centimetres, grouped according to the date of onset of the donor's illness. The mode of preparation closely resembled that used with meningococcal serum.

Dr. Macnamara said that she had dealt at some length with the means taken to guarantee a safe unirritating and effective product and the precautions taken and the intricacies of the technique adopted had made her very appreciative of the work being done at the laboratories in the preparation of other sera which they as clinicians used so light heartedly. Early diagnosis was essential for serum treatment. In New York arrangements were made for assistance in lumbar puncture and examination of the fluid to be available without charge for any practitioner caring for a patient suspected of suffering from poliomyelitis. By taking with him sterile equipment for lumbar puncture in the home, a microscope and means of fluid examination the "diagnostician" was able to help and save a second lumbar puncture, the fluid being examined while the needle with obturator replaced was left in the back. Following this example similar arrangements had been made to assist practitioners in the metropolitan area. On application to the Health Officer the services of Dr. Southby, Dr. Pennington, or herself would be quickly available. She was not claiming that all this was easy, that diagnosis in the preparalytic stage was simple or that provision of serum would save more than a small proportion of children, but the method had a rational basis, it had been carried out with good results elsewhere and it promised more than any treatment previously adopted. Its success or failure depended entirely upon the cooperation of the general practitioner.

There were two other matters on which she would be glad to hear discussion. The first was the matter of early splinting. They did not want to be faced with a large number of patients and to experience delay in securing rest to the spine and muscles resulting from an absence of adequate provision of suitable splints. It was on the question of the best type of splint to be kept in readiness for immediate rest that she would like to hear expressions of opinion. She wanted to know whether this splint should be a double Thomas's splint with a foot piece, some splints without foot pieces, some with arm pieces in graded sizes, which could be ordered according to the age of the child and which would be in readiness at once, obviating the interval existing between the ordering and procuring of a splint made to measure. The second matter was after care. Ninety-one cases had occurred in Victoria during the previous half-year and eighty-one survived, in other words there were eighty-one potential cripples. Many were being cared for, but in two or three months' time the interest of many mothers would have waned unless some supervision were exercised. In the search for donors in the suburbs she had found numbers with deformities which could be readily corrected. When asked why advice had not been sought, the answer was frequently: "We can't afford to buy him boots, irons or brace that was recommended." Instead of persevering parents had accepted the crippling as inevitable. In other cases of adults affected during 1925 financial worries were making an adequate period of rest in this important first six months very difficult of attainment. This after care of poliomyelitis, care of actual or potential cripples, might seem a matter apart from preventive medicine, but in the present state of knowledge it should be faced as the only means of preventing a life of dependence. In America, particularly in Vermont, this work of after care had gradually developed to a definite organization functioning throughout the year and insuring that every patient had adequate care from the time the quarantine was lifted until the best possible recovery had been made. Statistics of the work in Vermont showed that deformities were reduced and 20% of those engaged in active work were unable to walk when first cared for by the department. It was felt that financial support for such work in Victoria would not be lacking. Already one trust, known for its generous endowment of child welfare, had promised its sympathy, but was awaiting a definite organization and a formal application. Dr. Macnamara would like to see formed that night a small committee for permanent after care to inaugurate work on similar lines in Melbourne.

Dr. F. V. Scholes referred to the question of invasion by the blood stream. It was an important point and Dr. Webster had laid much stress on it. He suggested that in a scattered community there should be a central organization not only for early diagnosis of doubtful cases but also for the suggestion and supervision of treatment both during the acute stages and in the period of after care. Patients with poliomyelitis needed a great deal of time and attention which it was almost impossible for the general practitioner to give. A mere diagnosis of poliomyelitis, however early it was made, was not enough. Careful, prolonged and repeated examination was necessary not only of limbs or groups of muscles but of individual muscles and even parts of muscles. Many small local weaknesses were overlooked.

If a thousand persons were affected and were collected together, five men could look after them and direct the treatment of them all. For example all the patients in Vermont had been for years under one man and his assistants. This would mean benefit to the patient and benefit from a scientific point of view.

Regarding the question of serum Dr. Scholes said that he was not impressed with the New Zealand figures. Speaking from memory the figures up to a certain date were that of rather over a thousand patients receiving serum one hundred and sixty had died and the final results showed about an equal number with and without residual paralysis. The New York figures were in his opinion unconvincing. There were also no means of checking and properly tabulating the results. The same would happen in Victoria if serum were distributed in small amounts to individual practitioners—no idea of actual results would be gained.

In practice the diagnosis of poliomyelitis during the septicæmic stage was not likely to be made in the majority of cases. The advisability of lumbar puncture as a means of diagnosis and of the introduction of serum as a means of treatment during this stage was questionable. On the other hand, when meningeal symptoms appeared these measures should be adopted. He did not consider that serum administered at a later stage would be of any value.

Mr. W. Kent Hughes said he wished to justify the action that he took in March, 1925, when he called the municipalities together and asked them to form an organization to deal with the threatened epidemic. A special committee had been appointed and had advised that a special investigation officer be engaged to hunt up donors of blood and to collect serum and that three diagnosticians be appointed, namely, Dr. Macnamara, Dr. Pennington and Dr. Southby, who would be always on duty to respond to a call to aid the medical practitioner in diagnosis and in administering serum. It had also been suggested that a separate medical committee be appointed to act as an advisory board.

He laid stress on the importance of after care. Complete rest was most important and was neglected by even the best practitioners. He discussed the methods of obtaining complete rest. Complete plaster encasement was a very tedious method unless the doctor was accustomed to using plasters, but it was much the best. In regard to the difficulty of obtaining suitable splints he said that arrangements should be made to obtain a large supply of standard splints to be kept at a central depôt.

It should be born in mind that if one limb were affected the other was affected to a certain extent. The trunk muscles seldom escaped when either the upper limb or the lower limb was affected. Further observation and more care was necessary. In regard to the duration of rest he thought that three months was not too long. Ellis had pointed out that position of rest should be midway between extremes of movement of a joint. The activity of muscle should not be allowed under three months. One active movement was worth an immense amount of passive movement. Those in charge of the patient should be instructed how to teach the patient to use the muscles. They should put the child in a warm bath at the beginning. It was important to determine the electrical reactions. The points to be remembered were that all muscles should be rested as completely as possible and as soon as possible. Muscles should be kept at rest for some time. The other limb should not be neglected. As long as muscles were thin there was no period too late for treatment, but if the muscle was fatty, treatment was a waste of time.

Dr. H. N. Featonby apologized for the absence of Dr. Robertson who was unable to be present and to speak at such short notice. He spoke from the point of view of administrative control. Endeavours were made to prevent the spread of the disease by notification, by isolation of patients and contacts and by education of the community. Environmental diseases were easier to control than human infection. Dr. Featonby said that the *Health Act* could be invoked in regard to the question of isolation. In America contacts were isolated for twenty days and in New South Wales for a period of twenty-one days. In regard to the advisability of closing schools Dr. Featonby pointed out that this was held to be advisable in America. Two points should be noted in regard to education of the community. In the first place the possibility of creating a scare should be borne in mind and secondly provision should be made for the education of patients. It was necessary to give information to the public on the questions of personal conduct, hospital isolation of patients, handling and kissing and the necessity of putting the patient to bed at once and securing medical advice. In 1918 three hundred and three cases had been reported in Victoria and in 1919 two cases and three deaths. Years of epidemics were followed by years of quiescence. The figures of New South Wales and Victoria showed no close connexion with epidemicity. The year 1916 had been a "big year" in New South Wales and only comparatively so in Victoria. In conclusion Dr. Featonby asked for suggestions regarding propaganda and government help.

Dr. H. Douglas Stephens briefly outlined the different types of infantile paralysis and grouped them under superior and inferior cerebral, cerebellar, bulbar, spinal, poly-neuritic (?), meningeal and atypical or abortive varieties. He had the same difficulty in correctly naming this disease as the late Dr. F. Batten who had suggested the term polio-encephalo-myelitis. It was most exceptional to see a patient exhibiting both spastic and flaccid types of the disease and it was also rare to see a patient with even an extensive lower neurone type of involvement affected mentally. He instanced a boy paralysed in all limbs, spine and abdomen, who recovered complete power in one forearm and hand with which he did most excellent woodcarving; the boy's mental development had been of a very high order. The contagiousness of poliomyelitis was very low. In a severe epidemic in Melbourne some years previously when patients had been crowded indiscriminately in the out-patient department at the Children's Hospital, only one definite instance of cross infection had been noted. The incubation period was stated variously at from three to thirty-three days. In several instances in which he had been able to form an opinion, he thought about eight days was approximately correct. In some cases there appeared to be a familial tendency and quoting only one instance he mentioned that a father had suffered from anterior poliomyelitis affecting one leg; years later he (Dr. Stephens) had treated the eldest daughter for anterior poliomyelitis affecting the shoulder; recently the youngest child had developed it in the leg. He did not like to see rapid wasting occur as it presaged much residual paralysis. In many instances he preferred intelligent home treatment with frequent reeducative exercises to hospital treatment. Referring to Dr. Webster's remarks on lumbar puncture, he said that he had experienced numerous instances in which rapid improvement in paralysis had occurred immediately after the withdrawal of cerebrospinal fluid. He could not say whether early lumbar puncture before paralysis became evident was a routine to be advocated, but thought that removal of a small amount for diagnostic purposes could do no harm.

In respect to early clinical diagnosis in the preparalytic stage the occurrence of such symptoms as severe headache, neck or back pain, delirium, stupor, confusion of mental processses, hyperæsthesia, sweating and pain on moving a limb should always be regarded with suspicion.

Dr. Jean Macnamara then proposed:

> That the need for the formation of a permanent after-care committee for poliomyelitis be brought

under the notice of the recently formed Orthopædic Section of the Victorian Branch of the British Medical Association.

This was seconded by Dr. Morris.

The motion was carried and the Secretary was instructed to write to the Secretary of the Orthopædic Section.

THE HUNTER MEMORIAL FUND.

THE Honorary Secretaries of the John Irvine Hunter Memorial Fund have forwarded to us a further list of contributions to the fund. The total now stands at £1,583 3s. 6d.

Previously acknowledged to October 31, 1925	£1,339	10	6
E. W. Knox, Esq.	21	0	0
Drs. Thomas Minnett and Parker	15	15	0
Miss S. Macarthur Onslow	15	0	0
A. M. Edey	10	10	0
Drs. J. G. and W. A. Edwards	10	10	0
J. Leverrier Esq.,	10	10	0
Dr. Cecil Purser	10	10	0
Anonymous	10	10	0
Dr. J. C. Windeyer	10	0	0
Dr. R. Fairfax Reading	10	0	0
Dr. R. C. Winn	10	0	0
"An Admirer"	5	5	0
Miss E. Booth Clarkson	5	5	0
Judge and Mrs Curlewis	5	5	0
Dr. H. B. Devine	5	5	0
C. Brunsdon Fletcher Esq.,	5	5	0
Professor R. C. Mills	5	5	0
Dr. W. F. Simmons	5	5	0
Dr. F. Abbey Wiesener	5	5	0
Dr. C. R. Palmer	5	0	6
Dr. C. B. Pym	5	0	0
Sir G. A. Syme	5	0	0
Dr. L. Larbalestier	5	0	0
Dr. S. V. O'Regan	3	3	0
Dr. H. V. Lethbridge	2	2	6
Professor J. Le Gay Brereton	2	2	0
A. Dibley, Esq.	2	2	0
Dr. R. Fowler	2	2	0
Dr. P. L. Hipsley	2	2	0
C. P. Platt, Esq.	2	2	0
J. J. Quinn, Esq.	2	2	0
E. G. Waterhouse, Esq.	2	2	0
Professor D. A. Welsh	2	2	0
Dr. C. G. Berge	2	2	0
W. S. Deane, Esq.	2	2	0
Surgeon-Lieutenant W. E. J. Paradice	2	2	0
W. J. Bradley, Esq.	2	2	0
Mrs. C. G. Stone	1	2	0
Dr. W. M. Helsham (1st contribution)	1	1	6
Dr. E. MacArthur Sheppard	1	1	6
Dr. V. C. Brown	1	1	0
Miss C. Dowding	1	1	0
F. R. Duke, Esq.	1	1	0
Dr. F. N. Lynch (1st contribution)	1	1	0
Miss G. H. Marks	1	1	0
Miss E. L. Martin	1	1	0
D. Radford, Esq.	1	1	0
G. P. Stuckey, Esq.	1	1	0
E. M. Hawkins, Esq.	1	1	0
Dr. R. A. Willis	1	1	0
W. A. Trenchard, Esq.	1	1	0
Dr. Douglas Stephens	1	1	0
Miss J. F. M. Brown	1	0	0
Total	£1,583	3	6

Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xviii..

CANBERRA HOSPITAL: Medical Superintendent.

DEPARTMENT OF PUBLIC INSTRUCTION, BRISBANE: Medical Officer.

UNIVERSITY OF MELBOURNE: Independent Lecturer in Therapeutics.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429, Strand, London, W.C.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary. 30 - 34, Elizabeth Street, Sydney.	Australian Natives' Association. Ashfield and District Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham Dispensary. Manchester United Oddfellows' Medical Institute, Elizabeth Street, Sydney. Marrickville United Friendly Societies' Dispensary. North Sydney United Friendly Societies. People's Prudential Benefit Society. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association Proprietary, Limited. Mutual National Provident Club. National Provident Association.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane United Friendly Society Institute. Stannary Hills Hospital.
SOUTH AUSTRALIAN: Honorary Secretary, 12, North Terrace, Adelaide.	Contract Practice Appointments at Renmark and Murat Bay. Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Diary for the Month.

Nov. 24.—New South Wales Branch, B.M.A.: Medical Politics Committee.
Nov. 25.—Victorian Branch, B.M.A.: Council; Ballot paper issued.
Nov. 26.—New South Wales Branch, B.M.A.: Branch (Ordinary).
Nov. 26.—South Australian Branch, B.M.A.: Branch.
Nov. 27.—Queensland Branch, B.M.A.: Council.
Dec. 1.—Victorian Branch, B.M.A.: Branch; Ballot paper returned and counted.
Dec. 1.—Tasmanian Branch, B.M.A.: Council.
Dec. 1.—New South Wales Branch, B.M.A.: Ethics Committee.
Dec. 2.—Victorian Branch, B.M.A.: Annual General Meeting.
Dec. 2.—Section of Obstetrics and Gynæcology, New South Wales.
Dec. 3.—Section of Orthopædics, New South Wales.
Dec. 8.—Tasmanian Branch, B.M.A.: Branch.
Dec. 8.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
Dec. 9.—South Sydney Medical Association, New South Wales.
Dec. 10.—New South Wales Branch, B.M.A.: Branch (Ordinary).
Dec. 10.—Victorian Branch, B.M.A.: Council; Election of office-bearers, 1926, and appointment of Committees.
Dec. 10.—South Australian Branch, B.M.A.: Council.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, Sydney. (Telephones: MW 2651-2.)

SUBSCRIPTION RATES.—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rates are £2 for Australia and £2 5s. abroad *per annum* payable in advance.